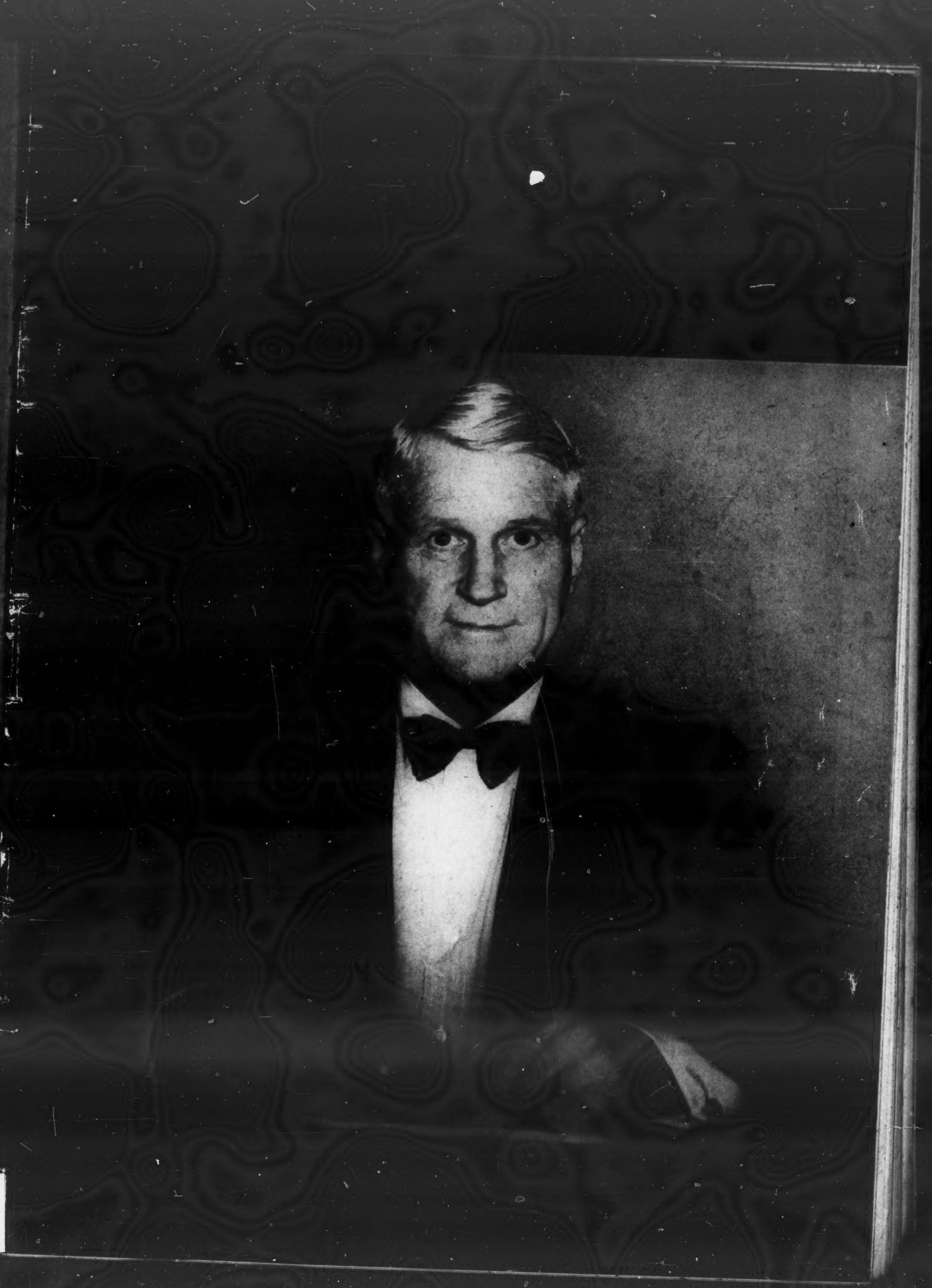

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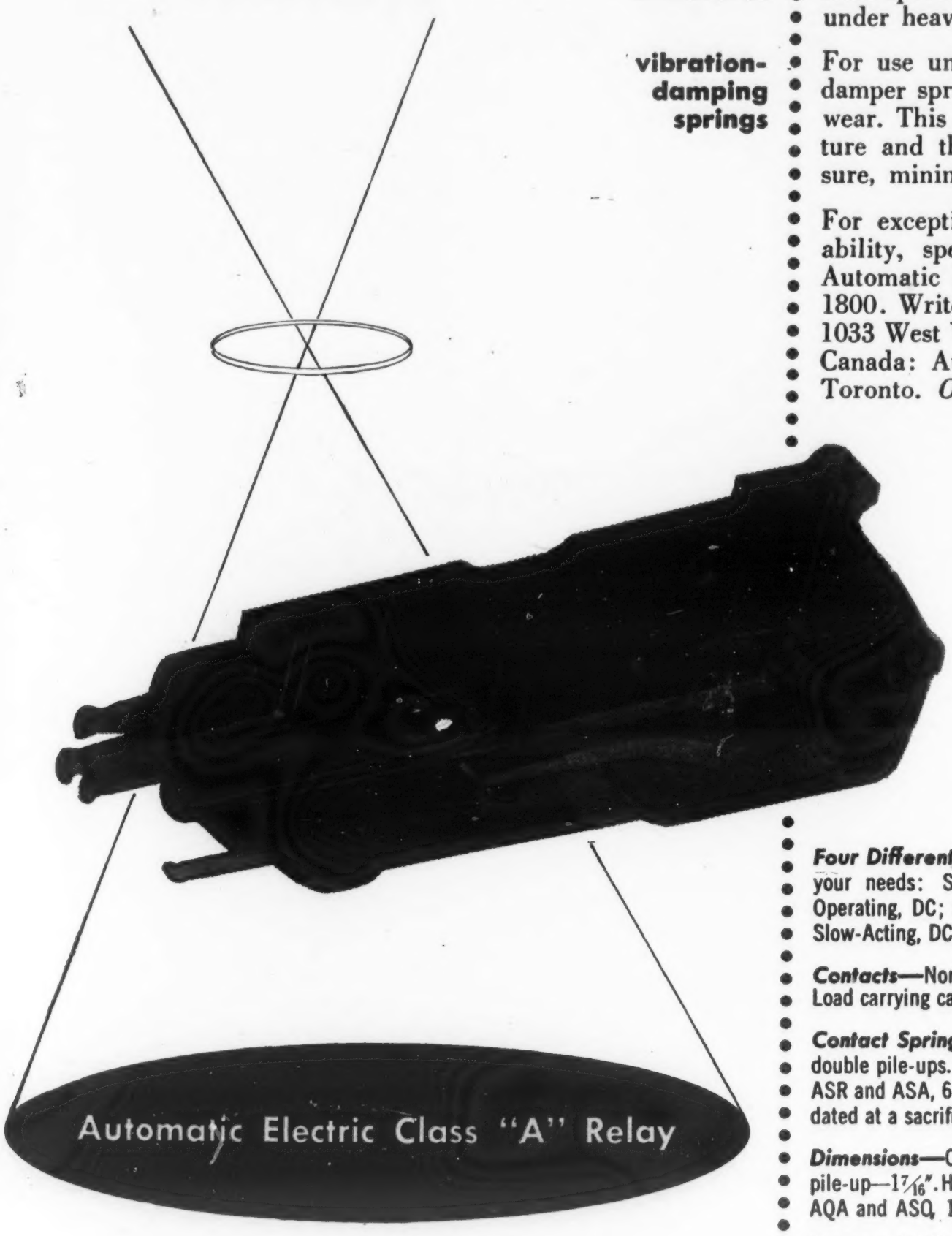

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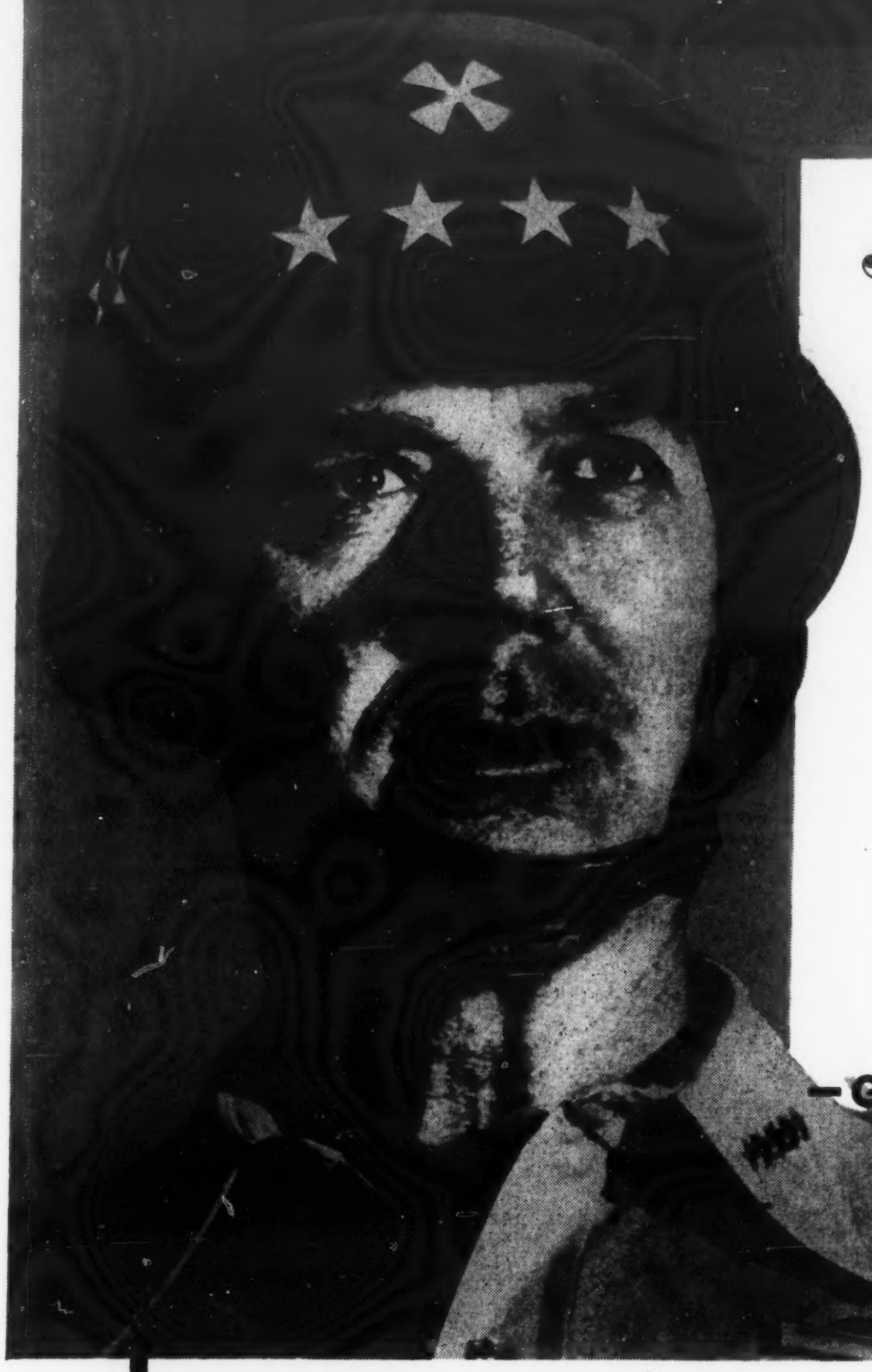

"There are peoples all over the world who are firmly on our side with their minds and hearts. They will gladly be on our side with their muscles as well, provided we go to the trouble of getting them started with their training and equipment. This is perhaps the only way the world can be kept free in the long run, for the U. S. can never hold all the possible fronts against Communism by itself. Our aim should always, in my opinion, be to help our friends to help themselves."

—GENERAL JAMES A. VAN FLEET

General Van Fleet has "looked the Chinese Red in the eye" and given his verdict: "If ever I should be called back to fight him again, I would go with a confident heart."

He knows the weaknesses of the enemy — and the strength of our friends. He has proved that our allies, with proper training and equipment, can produce first-rate courageous soldiers.

The experience and ability of General Van Fleet are rare. His straightforward words of advice should not be forgotten.

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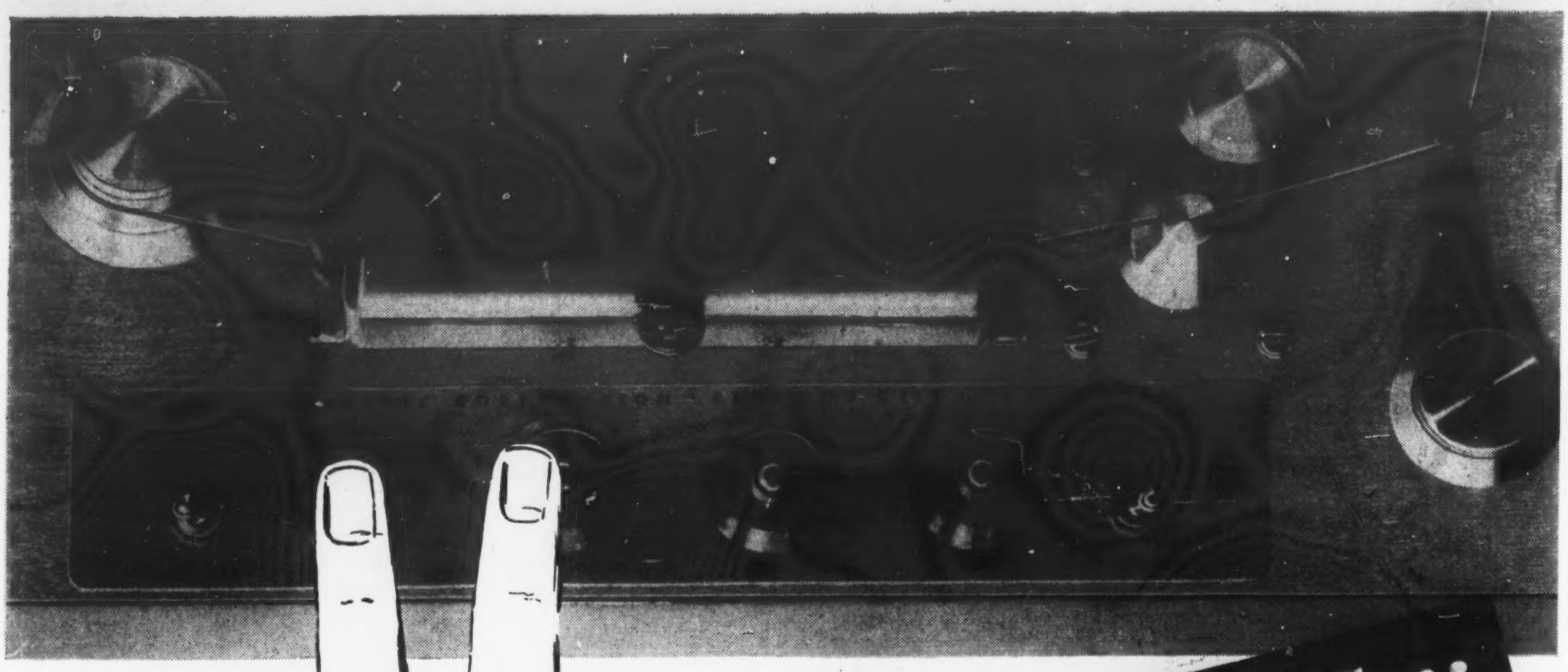

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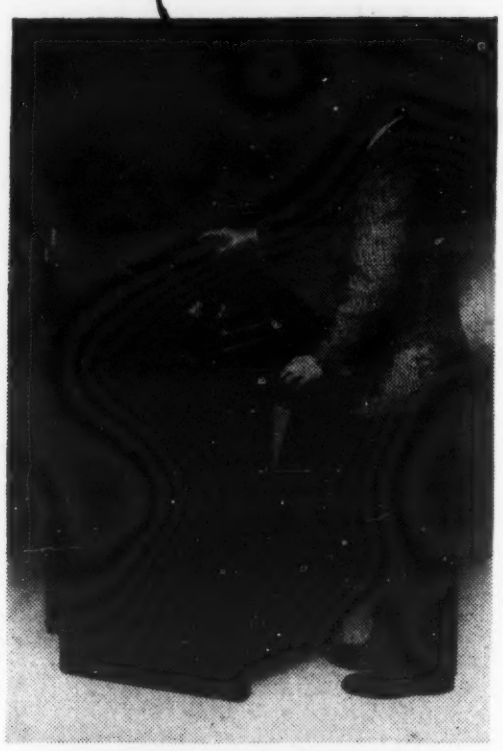

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THE COVER

Rear Admiral Joseph R. Redman, USN (Ret) was elected national president of the Association at the annual convention in May. Admiral Redman, now vice-president of The Western Union Telegraph Co., one of our charter group members, has a splendid background of experience in communications and electronics in both the military and commercial fields.

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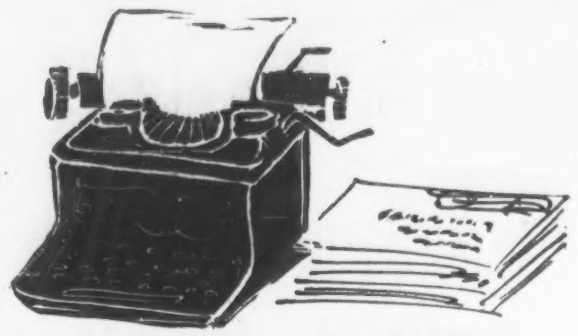

Letters to the Editor

"Doings" Delight

Dear Sir:

Just received a copy of "The Doings at Dayton," the special AFCA Convention issue, and I want to congratulate you and the other responsible people for turning out such an excellent report. I think a similar pictorial issue should be a "must" after all future conventions.

PAUL CLARK
Dayton-Wright Chapter

Gift Idea

Dear Sir:

Every year in August, as is a custom in our family, we prepare a celebration honoring a special occasion in my Dad's life. All the members of the family give various gifts. This year I thought I might give your Association Medal as my gift. Dad is a Lt. Col. in the Signal Corps at Fort Dix and a member of your organization.

Therefore, would you please write and tell me the various prices and if the medal has a separate service ribbon that can be worn without the medal, and if so, the price for both and the separate prices.

Thank you for all consideration.

PAUL DORSEY
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Welcome Support

Dear Sir:

. . . As an AFCA Group Member and an advertiser in your excellent publication, SIGNAL, we are ever anxious to lend our wholehearted support to the fine work which the Armed Forces Communications Association is doing in strengthening our national security. . . .

V. L. HAAG
Vice President
The Gray Manufacturing Co.

New Member

Dear Sir:

It gives me great pleasure to write this letter and enclose my application for membership in the Armed Forces Communications Association.

I have been trying to lay hands on issues of the magazine SIGNAL regularly, but they are difficult to get and then usually rather old. But I recently was able to buy one "hot off the press" when I happened to be browsing through the magazine rack in the Seoul City PX. In the magazine I came upon this application blank which I had been seeking for some time in order to affiliate myself with the organization and its aims.

Having served in World War II with the Signal Corps and now back in as a Communications Officer with the Artillery, I have become very interested in the communications field, particularly military communications equipment and systems. I intend to follow this field in my civilian career which is due to start in the not too distant future.

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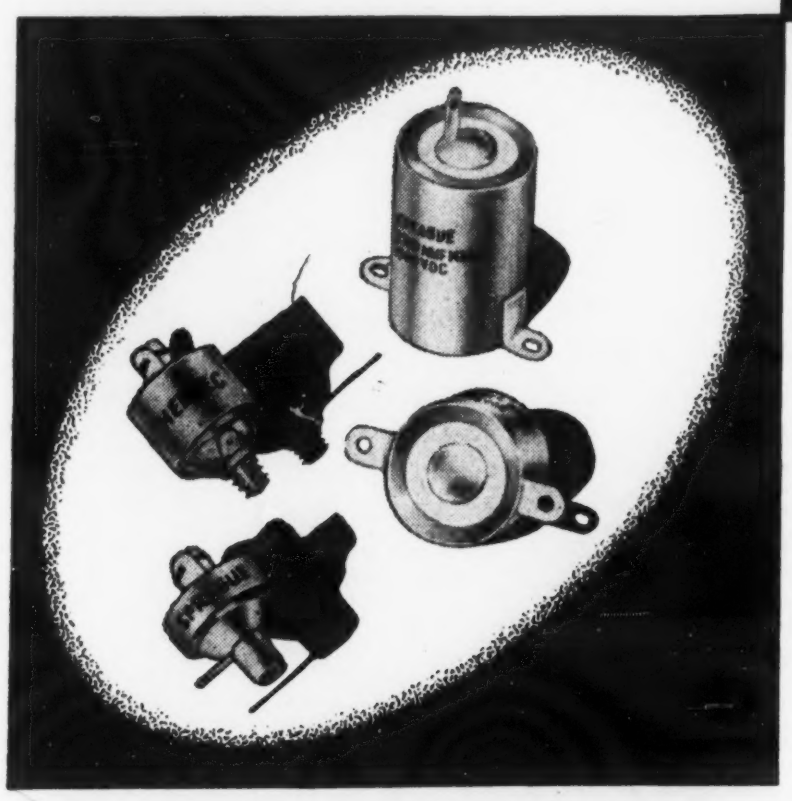

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Communications

by Lt. Colonel John E. Morrison, Jr., USAF

IN THESE TIMES, IT HAS BEEN SAID, EVERYONE HAS A system. I have never had any success with race horses, but I'm told that there are systems to handle that problem too.

The word system has become tremendously popular in the English language. Wherever we turn we find the word being applied to some scheme or operation. Daily we come in contact with some private, commerical or governmental enterprise in which the word "system" is associated in some way—in education, transportation, power and many others. Moderns have become systems conscious. We have been compelled to create systems to meet the complex needs of our contemporary civilization.

Like our civilian colleagues, we in the military services have been forced to recognize the system's need. Today, the military cannot function without systems—weapons systems, supply systems, transportation systems, defense systems, control systems and of course communications systems.

We all recognize, I am sure, that anyone who speaks on the subject of communications systems, especially the philosophical aspects of the subject, is "playing by ear" for the most part. I believe that it is also oddly true that this is a subject about which everyone invariably knows more than the unfortunate individual who happens to be speaking at the particular time. To put it simply, all of us consider ourselves experts when talking about the philosophical aspects of communications systems. And because all of us are enlightened on the subject, we find that there are many divergent opinions in this field. While most of us would agree generally that communications systems are very necessary in our military program, we rarely find a group of communicators who are in complete accord on the definition of a system or the principles and concepts associated with communications systems planning.

The area of thought explored in Col. Morrison's lecture contains more than enough room in which other communicator's may maneuver. The Electronics Division of the Air Command and Staff School, Air University at Maxwell AFB will welcome comments and opinions on the subject from the readers of the article.

The reason for these differences in opinion and attitude are simple and straightforward. We have had different training and different military experiences. These differences are bound to flavor our ideas on communications systems philosophy.

In preparing for our discussion, I sought out the opinions of numerous senior communicators. I asked each for his personal opinion on the distinguishing features of a communications system. Some believed that *centralized control* of both administration and operations was the most important distinguishing feature. Others believed that a communications system should be centrally engineered with all stations in the system, constructed and operated similarly. Still others believed that *size* was the distinguishing feature—that it would be inappropriate to consider a three or four station net, a system. And some said that there should be *organizational integrity*—one organization responsible for the system.

Certainly it may be said that the majority of individuals with whom I discussed this subject had a keen appreciation of the technical theorems and standards applicable to communications systems. Yet does it not seem as strange to you as it did to me, that there should be so many varied opinions on the nature and characteristics of a system? We are prompted to conclude that generally, communicators have not given real thought to the entities which must be present before we have a system in fact rather than in name only.

Definition of Systems

As the first and important step in reaching some understanding on the philosophical aspects of communications systems, we must ferret out an acceptable definition of the term "communications systems." Not a definition for definition's sake, but a definition which might be applied in the laudatory sense. If we can define the term in a meaningful way we will have a better idea of the important features or characteristics of this thing called a "communications system."

We have searched far and wide for a definition of the phrase "communications systems," and we must report with some reluctance, that no satisfactory definition could

Systems Philosophy

Moderns have become systems conscious. We have been compelled to create systems to meet the complex needs of our contemporary civilization. The author outlines various communications systems in this transcript of one of his lectures at the C&E Staff Officer School of the Air University.

be uncovered in our regulations, letters, technical manuals, text books or trade journals. So, in preparing for our discussion, we started from scratch and built our own. We could not find a definition of the entire phrase in old reliable Webster, but we found a usable clue in the definition of the word "system." This was the definition: "A group of units so combined by art as to form an integral whole and to operate in unison in obedience to some form of control." Therefore, if we take slight liberties with Webster, we might infer that a communications system is "a group of communications facilities so combined by art as to form an integral whole and to operate in unison in obedience to some form of control."

Analyzing our definition, we note that it may be dissected into four separate elements.

a. a group of communications facilities
b. so combined by art as to form an integral whole
c. to operate in unison
b. in obedience to some form of control

As the next step in our process of achieving some degree of harmony on the philosophical aspects of communications systems, let us determine the implication of each element in our new found definition.

Personnel and Equipment

The very first element of our definition—*a group of communications facilities*—implies two things, personnel and equipment. This is one of the less profound implications of our definition. All of us will readily accept the fact that the foundation of any communications system is its operating personnel and equipment. Since the subject of personnel and equipment will be labored in detail throughout most of your course we will pass on to the more fruitful portions of our definition.

Technical Compatibility

The next important element of our definition is the phrase—*so combined by art as to form an integral whole.* Isn't this phrase synonymous with the phrase *technical compatibility?* Isn't the capability of the various facilities to function together in an integrated manner inferred in the phrase—so combined by art to form an integral whole? I believe that it is. If we are to have a communications system it must be possible for the various facilities or stations of the system to communicate with other facilities in the system. For example, a transmitter multiplexed on one end of a communication channel must, of necessity, work into "demuxing" equipment on the other end of the channel. We see, therefore, that the first meaningful implication of our definition, exclusive of personnel and equipment, is *technical compatibility* of equipment. Bear in mind that we do not mean that it is necessary to operate identical pieces of equipment on each end of a communication circuit. For example, we find that the tributary equipment in the domestic stations of the AIRCOMNET is usually of the Type 15 or Type 19 teleprinter variety and yet it is technically compatible with the highly complex Western Union semi-automatic relay equipment operated in the major relay centers. This is a rather simple example but it serves to illustrate the point. Manifestly, no arrangement of communications facilities which lack *technical compatibility* may be described as or considered as a communications system.

Common Purpose

Thus far we have found that to have a communications system, we must have a group of facilities so combined by art as to form an integral whole. Now we note, significantly, that these facilities must—*operate in unison.* What implications are contained in this element of our definition? First, we believe that *common purpose* is implied. All communications stations in a related group must serve a common purpose if we are to refer to the facilities as a system. The communications functions carried out by the related facilities must be directed towards a common goal. For example, in the case of the AACS, we find the common, primary purpose is to relay messages pertaining to the flights of military aircraft. In the case of the AIRCOMNET, we recognize that the common purpose is to relay command and administrative messages of the Air Force. And so we see that the first implication of the phrase—*operate in unison*—is common purpose, common aim, or common goal.

What other features are implied in this term—*operate in unison?* Would it not imply *common procedures?*

Certainly we would all agree that any communications facilities joined together for a common purpose must also employ common procedures if they are to function as a whole. No group of communications facilities could ever be considered as a system if common procedures were lacking. It is fundamental that if a group of facilities are to operate in unison they must use a common communications language.

Further, we believe that one other thought is implied by the term—operate in unison—that thought is coordinated action.

At first glance, some might consider that *coordinated action* is inferred in the terms *common purpose* and *common procedures.* We believe that coordinated action should be considered as a separate element. For, although our system is to serve a common purpose and although we are in complete agreement on the common procedures, our facilities do not really begin to function as a system until we introduce the element of action. Hence, the final implication of the phrase—*operate in unison*—is coordinated action.

What do we mean by *coordinated action?* It means doing things at the right time; changing frequencies when they should be changed; insuring the efficient flow of traffic over all parts of the system and it also means the capability of employing our communications facilities flexibly when the necessity arises. These are the things we mean when we use the term coordinated action, for without the feature of coordinated action, our so-called system is no more than a series of related communications facilities operated on an uncoordinated basis and certainly unworthy of the designation—communications system.

Control

One of the subjects mentioned at the very beginning of our discussion was the feature of *control.* It was said that some communicators believed that the nature of the control exercised over a group of facilities was an important, if not the most distinguishing feature of a communications system.

This brings us to the discussion of the final element of our definition—*in obedience to some form of control.* We note significantly that our definition does not prescribe a particular type of control. The definition merely indicates that some form of control is necessary. We might also observe that this final element in our definition is of a different nature than those we have previously discussed. It is different in that this particular feature has a direct influence on all of the previously implied features or characteristics of a system. The form of control exercised over a communications system directly affects the development and fostering of common purpose, common procedures, coordinated action and technical compatibility.

In the military services, the forms of communications systems control are not unlike those found in commercial communications. The reason for this stems from the marked similarity between the facilities which comprise both commercial and military systems. Commercial and military systems employ personnel with similar technical qualifications and equipment with similar technical characteristics to perform similar communications tasks. There is, however, one point of distinction between commercial communications and military communications. It relates to the matter of common purpose which we discussed earlier. The common purpose of all commercial systems, as all of us will agree, is financial gain. In the military, our purposes will vary depending upon the mission for which each communications system was designed.

Let us examine some of the forms of control exercised over communications systems today.

Centralized Control

The combination of facilities to operate in unison as a communication system may be accomplished by *centralized control.* By Centralized Control we mean absolute and unqualified command and operational control of the system vested in one top level organization. And this control is exercised over all of the facilities of the system. Control of the people, the equipment, and the manner in which the mission of the system is executed.

A good illustration of a system over which we find this form of control or administration exercised is found in the Western Union System. All of the subordinate units or facilities are owned and controlled by the top organization in New York. This top organization can assure continued technical compatibility of equipment, vigorous pursuit of the common purpose, strict adherence to common procedures and the highest degree of coordinated action.

And here we pause to note a significant point: One of the most traditional and obvious ways of administering a communications system (or making certain that our facilities operate in unison) is under an arrangement of *centralized control* such as is found in the Western Union System. Obviously, such a high degree of control is not always possible. The reasons for this we will discuss later.

What about an example of a communications system administered under this form of control in the military services? Do we have any systems in which we find such a high degree of control exercised? Perhaps the one system within the military services which more closely approximates a system operating under Centralized Control is that which is found within the USAF, and known until recently as the USAF Teletype Relay System, or Plan 51 System (now under AACS and described as the domestic portion of the AIRCOMNET). Command, operational and administrative control is *almost* absolute within this system, with the control of the system being vested in a communications group organized for the sole purpose of operating this system. Note that I said *almost* absolute control. It is necessary to shade the degree of control to that extent because we find that the tributary stations of the system are under the administrative and operational control of the unit commander of the base at which the tributary is located. Therefore, but for that one consideration, our Plan 51 System operates under the centralized form of control.

To illustrate this high degree of control, perhaps even more poignantly than I have done thus far, I might tell you about a talk I had with the Chief of the Communications Systems Division for the Director of Communications, Headquarters USAF. He told me of certain procedural difficulties which were experienced by one of the Plan 51 tributary stations when the system was activated. The procedural difficulties were such that they were causing trouble throughout the system. Consequently, the Plan 51 Group Commander advised the tributary station that effective immediately, the station would be removed from the net. Accordingly, the station was cut out of the net for a short period until the procedural difficulties of the station were eliminated. That, in my opinion, is a good example of Centralized Control in action. It is an excellent illustration of the ease with which common procedures and coordinated action can be assured under centralized control.

The next form of control we might call *split control,*

which may be described as top level or centralized control of plans and policies accompanied by decentralized control of administration and operations. By the latter portion of that statement, we mean that all responsibility for administering and operating the individual facilities of the system is vested in the authorities or commanders, at lower echelons. You will note by the very description of this form of control that the scope of the top level control is diminished in comparison with that which exists under centralized control which we have just discussed. There are many good examples of systems which function under this second form of control.

Split Control

In commerical communications we find an excellent example in the Bell System. The top level organization, the American Telephone and Telegraph Company, has fairly rigid control of the operating policies and procedures used throughout the system, thus assuring common purpose, common procedures and coordinated action among the various facilities in the system. Western Electric and Bell Laboratories, representing other agencies in the top level organization, assure a high degree of technical compatibility between the various operating elements. Yet the subsidiary companies which make up the Bell System have a high degree of "sovereignty." They are responsible for administering their local organizations and for exercising operational control over the portions of the Bell System within their respective geographical areas.

In the military services we find that the Navy Teletype System (NTX) and the Army Command and Administrative System (ACAN) are controlled in much the same manner as the Bell System. The facilities of the Navy NTX System belong to the various Naval District Commanders who "own" the people and the equipment, yet they look to the Director of Naval Communications in Washington for policy guidance and high level planning with respect to the entire NTX System. The same is true of the ACAN System. The system facilities are owned "lock, stock and barrel," by the Army Area Commanders in the United States and the Senior Army Commanders in overseas theatres, who look to their Staff Signal Officers for the administrative and operational control of ACAN facilities within their respective areas. Yet the Chief Signal Officer in Washington maintains an ACAN Staff which establishes system policies and undertakes the planning and engineering for the system.

Lastly, but certainly not the least, we find our own Air Force AACS System within this category because of the degree of control exercised by the top level AACS Commander in Washington today. I have used the word "today" because the degree of control exercised by the Commanding General, AACS, today is not quite the same as that exercised by him during the war, and for a short time subsequent to the war. Perhaps some of you are somewhat surprised to find AACS in this category. Perhaps too, we might say that very careful scrutiny of the degree of control exercised at the present time by Headquarters AACS over the entire system might place the system somewhere between our first two catgories of control. Yet we cannot say that it falls within the first category because the AACS is most definitely not a system operated under Centralized Control. We find the evidence for that statement in a current Air Force Regulation which states that Air Force Base commanders within and outside of the United States have been given operational control of the AACS facilities located on their bases. And to make certain that the regulation has "teeth," Base Commanders have been given the responsibility, by regulation, for advising AACS Squadron Commanders in the preparation of the effectiveness reports of the AACS Detachment Commanders on their respective bases. This is a rather good way of insuring that operational control is retained at the base level!

Decentralized Control

Our third and final type of control is at the extreme lower end of control gamut. For want of a better way of describing it, we will call it *decentralized control* or control exercised by voluntary cooperation between the various agencies participating in the system. Perhaps you might be prompted to say, "Just a minute. You have gone so far down the control scale that you have decentralized us right out of the systems business!" And I would reply, "Not at all." For I maintain that it is possible to have a communications system or to refer back to our definition, "a combination of facilities operating in unison," on a voluntary or decentralized control basis. Fortunately, there are systems functioning today on this basis to prove our point.

The outstanding examples are the well-known worldwide commercial communications systems functioning with technical compatibility, common purpose and procedures, and with coordinated action. Yet these systems function very well under *decentralized control*. The respective overseas terminals which, when combined make up these systems, belong to the foreign nationals of the country in which the individual terminals are located.

THE AUTHOR

Lt. Colonel Morrison began his military career in the Signal Corps, but was transferred to the office of the Directorate of Communications, Army Air Corps, early in World War II. From that duty, he was assigned to the AACS and served with them until 1946 when he was ordered to the Directorate of Communications staff at Headquarters, USAF. He is now on duty at the Air University as an Instructor in the Electronics Division of the Air Command and Staff School.

Control of these systems is exercised by voluntary cooperation among the participating agencies.

As far as the military services are concerned, we saw many examples of communications systems which functioned under this type of control during the last war. This is the basis on which Combined Communications Systems, or systems operated in conjunction with our Allies, functioned. This too is the basis on which most of our high level inter-theatre systems function, today as well. Under this particular arrangement, we find no individual top level organization owning and directing the entire system but rather, in all cases, the interested parties agree that a system is needed and they proceed to meet the requirement on a voluntary basis.

These, gentlemen, then are the three general forms or degrees of control exercised over communications systems as we have defined them today. Remember that there may be varying shades of each of those forms of control we have examined. This might be an opportune time to make one further observation concerning communications systems. Communications systems may be said to be microcosmic in nature. In communications, there are systems within systems just as there are systems within systems within the anatomy of man. For example, within the AACS we find the Plan 51 System (now known as

the domestic facilities of the AIRCOMNET), and from our previous discussion we have noted that while AACS in general operates its facilities under *split control,* Plan 51, on the other hand, has been described as operating under *centralized control.* This distinction exists because the major relay stations of the Plan 51 are not under the operational control of a Base Commander as are all other AACS facilities. And so we see that the form of control will not only vary between different systems, but will vary between systems within systems.

Advantages and Disadvantages of Each Form Of Control

It is frequently impossible for the communicator to say that we will use this form of control for this system, and that form of control for another system. The form or degree of control exercised over a system, as well as the very design of the system itself, will frequently depend on many factors beyond the realm of the responsibility of the communications planner. It would be well for us to explore some of the more obvious advantages and disadvantages inherent in each of the three forms of control. While it may not always be possible for planners to influence the form of control under which a system may function, we should, nonetheless, recognize some of the merits and some of the pit-falls in the control arrangement under which we may find it necessary to operate.

Centralized Control
Advantages and Disadvantages

Previously I pointed out that in *centralized control* we have the most obvious way of establishing and operating a communications system. Observe that it is relatively easy for the top level agency to assure that all communications system standards are adhered to in the highest degree. By virtue of this strong form of control, the top agency can make certain that all elements of the system operate technically compatible equipments, perform only those tasks which serve the common purpose, use common procedures and closely coordinate all system activity. Bear in mind that these features may be influenced with a minimum of interference from outside agencies.

As to our second advantage, we find that a system operated under this form of control possesses a high degree of flexibility. Yet it only possesses this high degree of flexibility as long as the demands made upon the system do not suddenly exceed the maximum capacities of the entire system. Under a *centralized control,* it is relatively easy to re-terminate circuits to respond to the traffic load and flow at a moment's notice.

Further, the system is completely independent and self sustaining. In the absence of a serious emergency there is no necessity for the top echelon to seek assistance from outside agencies in the execution of the communications mission. The control of all the communciations tools is vested within the top level agency to use as it sees fit in the operation of the system.

A fourth advantage is that such a high degree of control over the system makes it possible to realize certain economies in operating personnel and equipment because these may be shifted around the system as the need arises.

Finally, all of our expensive executive and engineering talent is centrally located and more profitably employed than would probably be the case if they were parcelled out through the system.

The first disadvantage which comes to mind is that unusual traffic demands on the system beyond the maximum capacity of the system may not be met under the arrangement of centralized control. Such contingencies may not be easily met because outside agencies may be somewhat reluctant to provide the assistance needed to support a system in which they have no command or control voice.

The second disadvantage inherent in such an arrangement is that the inefficiencies within the system are more easily concealed.

The third disadvantage is that headquarters' overhead is considerable. A large number of administrative personnel are usually required to administer an extensive system operated under centralized control.

Split Control
Advantages and Disadvantages

When a system is operated under *split control,* the commanders in the lower echelons associated with the system are more responsive to the personnel and equipment needs of the system. If a commander has been given operational control of some part of the system he will be more inclined to make certain that those facilities of the system under his jurisdiction are operating effectively.

As a second advantage, we find that the headquarters' overhead is relatively low when compared to that required to administer a system operated under centralized control. This is true because there is no need for headquarters personnel to administer troops and units since that function is decentralized and performed at the lower echelons.

The third advantage is that under this split control, just as we have found under centralized control, all expensive engineering and managerial talent is centrally located and normally more economically employed.

Under disadvantages, first, having assured the cooperation of the local commanders by granting them operational control of the facilities which comprise the system, the top level organization has lost some of the sovereignty which might be enjoyed under the system of centralized control. Because of this loss, there is always the possibility that the top level people responsible for overall system policy and planning may, on occasion, clash with those commanders in lower echelons who are responsible for operational and administrative control. The occurrence of such clashes would depend on how judiciously policy matters are coordinated between the interested agencies in the system.

As the second disadvantage, we find that any unusual demands made on the capacity of any part of the system might be difficult to meet because the top level agency does not own the people and equipment located at the terminals of the system. These belong to the commanders of the bases at which the facilities of the system are located. Hence, it may not be possible to shift people and equipment about the system as needed or as quickly as might be desired.

Decentralized Control
Advantages and Disadvantages

Under this type of control we might say that our first advantage is that we are permitted to establish a communications system without waiting for command relationships and responsibilities to be clearly defined.

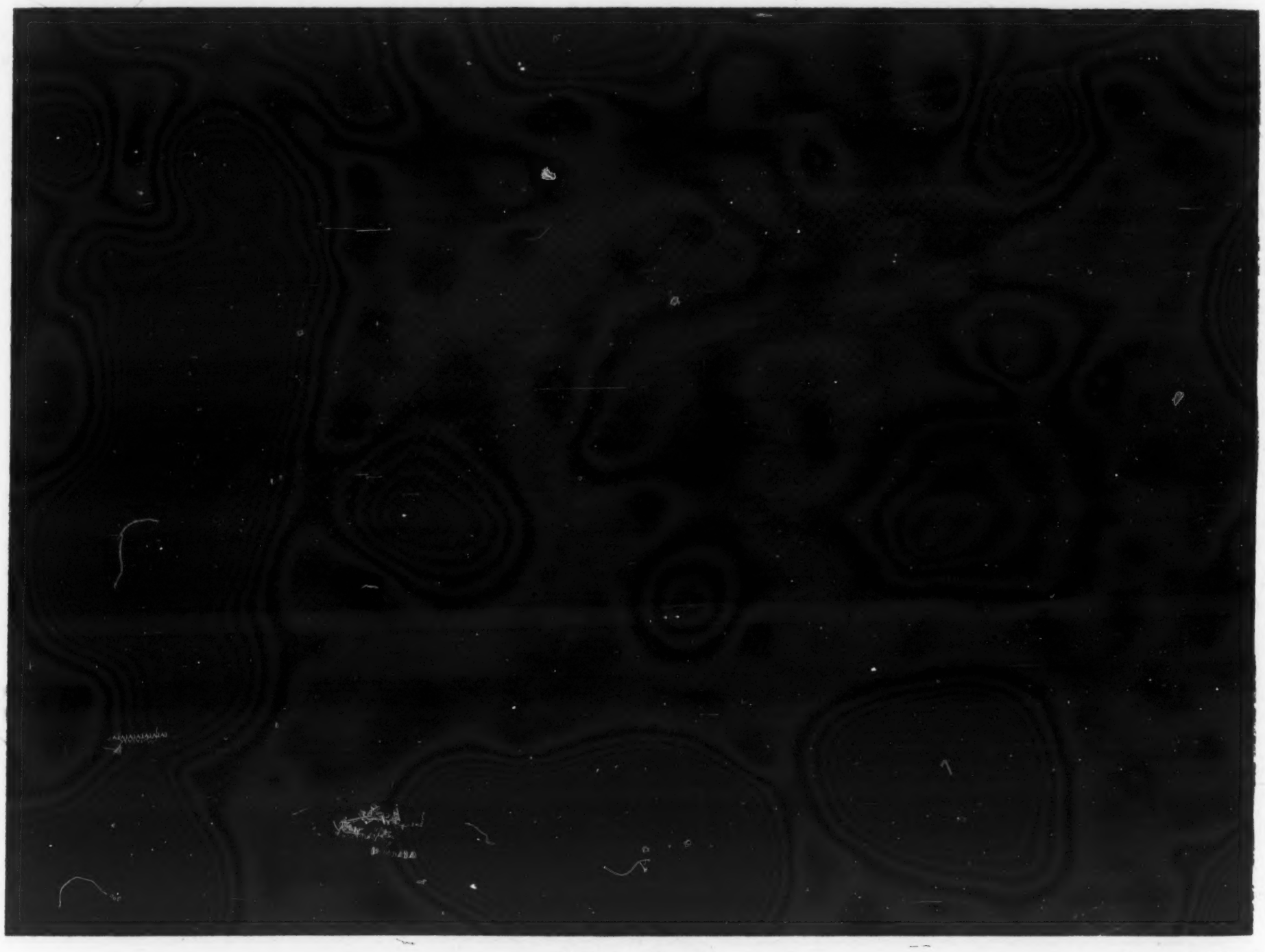
As a second advantage, we might say that under such an arrangement we would probably have an extremely broad personnel and equipment base from which to operate, assuming that the parties to the system are allowed access to the combined resources of all of the participating agencies.

As our third and final advantage, we would probably find that since all participants in a system which functions under *decentralized control* have subscribed to the system

(*Continued on page* 66, *col.* 1)

CRYSTALS for DEFENSE

The Downing Crystal Company of Baltimore, Maryland has recently been selected by the Signal Corps to process Synthetic Quartz, a revolutionary material for the manufacture of radio crystals.



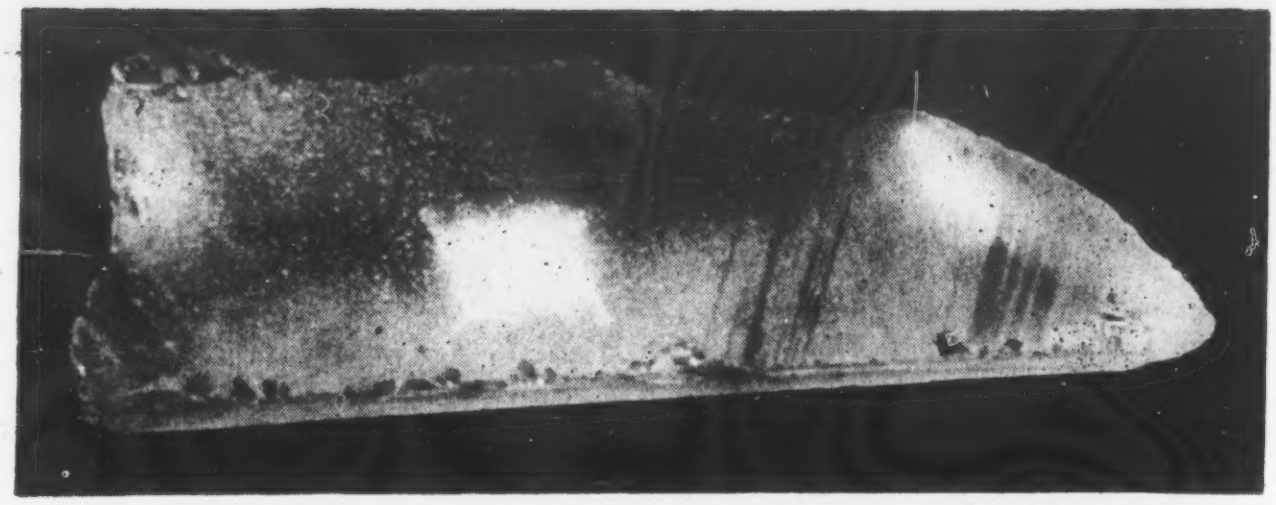
Synthetic Quartz

MORE THAN 100,000 YEARS AGO records show that men of the Stone Age used flint, jasper, and rock quartz in making work instruments for the tipping of spears. Rock quartz crystal found its way into many forms of ornaments such as beads and pendants. It is interesting to note that in at least a dozen places in the Bible mention is made of many of the quartz family minerals and the quartz crystal which today is the raw material, from which frequency control crystals are manufactured for both military and commercial use, was described in the Bible and properly named "crystal."

The first record of organized mining of quartz minerals occurred about 3500 B.C. when the early Egyptians mined rock crystal and amethyst. Today, America's major source of rock crystal is mined in the jungles of Brazil. Because the crystal is found in such inaccessible locations, it is impossible to perform the mining operations with modern mechanical equipment. So, the primitive method of surface mining is carried on. A hole, gigantic in diameter, is dug to a depth of approximately four feet. Within this opening and at a smaller diameter a second hole is dug approximately four feet deep. This series of holes, each smaller in diameter, is dug until the miner to able to

proceed to the bottom level by way of this series of steps. The rock crystal or "mother quartz" is mined at the bottom level and hand passed to the various levels until it reaches the surface.

Mother quartz is always hexagonal in shape. Although its outward appearance varies in overall size and general appearance, the geometric relationship of its molecular structure and atomic planes always remains constant.



Preliminary inspection for determining all defects in quartz shows up parallelogram which gives the x, y and z axes locations necessary for cutting angles.

History of Crystals

Pierre and Jacques Curie discovered the Piezo-electric properties of quartz and certain other minerals in 1880. Catalogued only as a scientific discovery at that time it was not until 1910 that a scientist named Voigt published a series of papers on quartz. In 1917, but too late for use in World War I, the piezo-electric crystals were applied to submarine detection work because of their proven ability to respond to supersonic waves.

Quartz crystals were used for the first time to control radio frequency oscillators during the periods 1923-1926 when patents were issued to Dr. Walter G. Cady of Weslevan University. Professor G. W. Pierce of Harvard University found valuable information regarding the application of quartz crystals and was also issued patents.

During the year 1924 quartz crystal began to find its application beyond the laboratories and experimenters stage; the broadcast industry and then the airlines adopted techniques of crystal control of radio transmitters and receivers. Radio amateurs soon began to contribute considerably to the ever increasing techniques of applications.

Methods similar to the old gem cutters techniques were used up to 1935 in the manufacture of quartz crystals. The Bell Telephone Laboratories and their affiliate, the Western Electric Company, as well as one or two other prominent independent crystal manufacturers, conducted an extensive program of research and development. Their results culminated in the development of nearly a dozen different orientations (cuts) of crystals at the beginning of World War II and a vastly improved manufacturing process.

Bought from Bendix Radio

During World War II, one of the major producers in the military sponsored quartz crystal program was the Bendix Radio Division of the Bendix Aviation Corporation, Towson, Maryland. This company produced crystals that were either the air gap or pressure mounted types utilizing molded phenolic holders with neoprene gaskets and phenolic or metal cover plates. Throughout World War II, Mr. John W. Downing served as General Foreman, Crystal Shops, and later as Superintendent, Crystal and Transformer Division. At the end of World War II crystal manufacturing operations were reduced to a minimum and rapidly became a skeleton operation. In 1948 the management and ownership of the crystal manufacturing operation of Bendix was obtained by Mr. Downing along with experienced key personnel and today operates as the Downing Crystal Company.

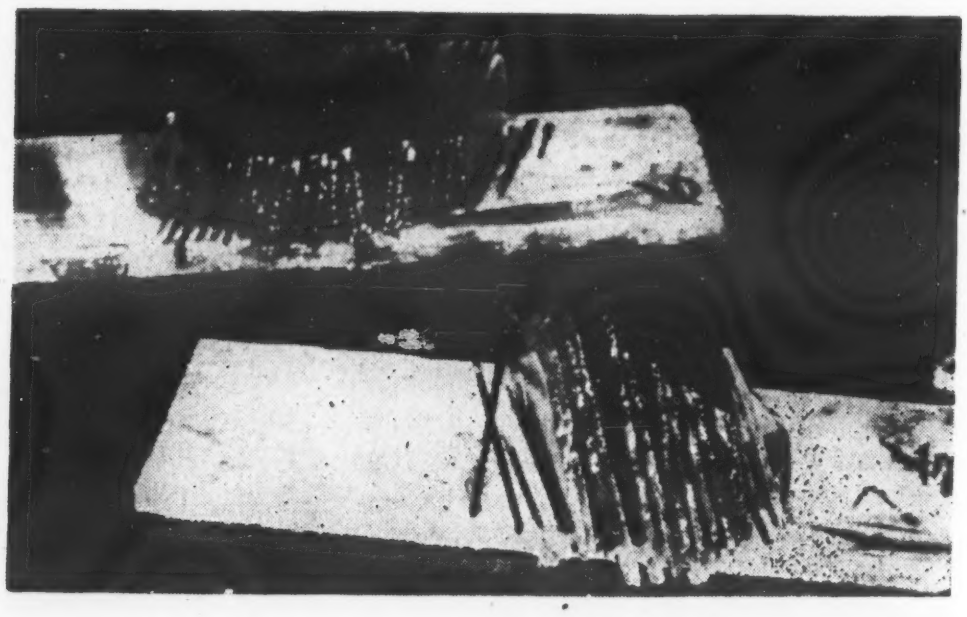
Three Applications

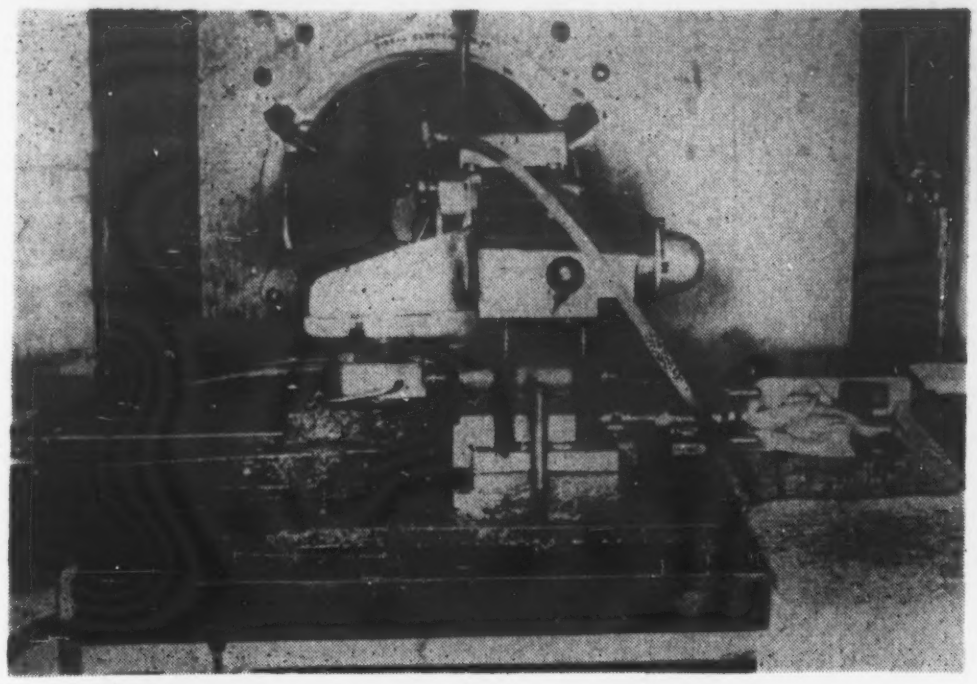
Quartz crystals have three major applications; first, to stabilize or control frequencies of oscillators in radio transmitters and receivers; second, to provide a filter in radio receivers allowing the rejection of unwanted signals; third, but not least important, as a frequency standard to calibrate other signal equipment.

No matter what the application, the manufacturer of the quartz crystal follows essentially the same process from beginning to end. Upon receipt, by a crystal manufacturer, the quartz must be cleaned in an acid bath to remove coloration and provide clean surfaces for examination. It is then inspected by means of polarized light in a tank of clear oil in a partial monochromatic light to

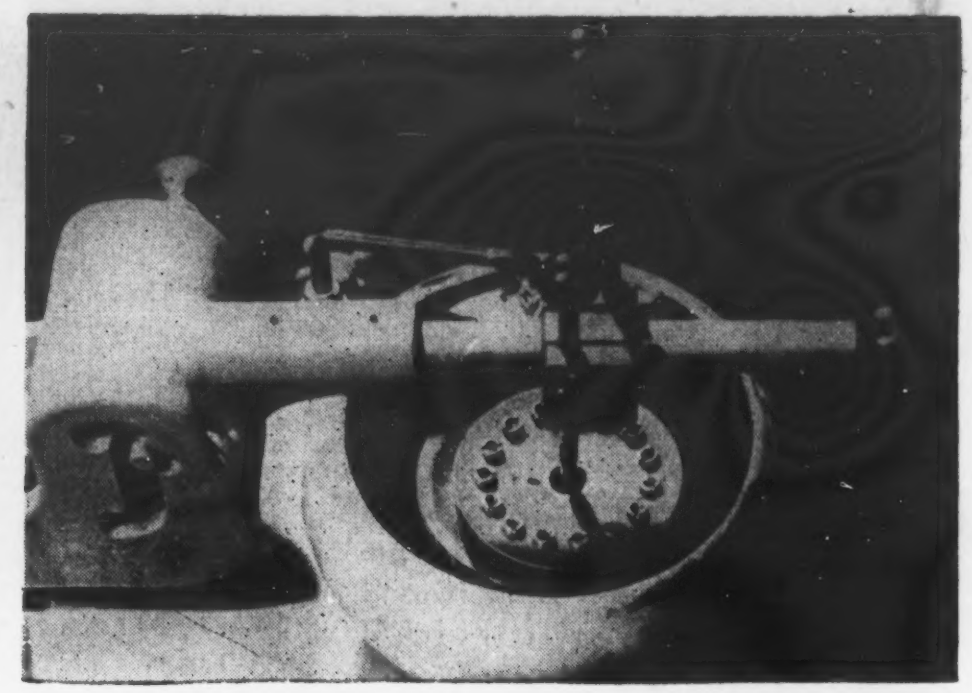
Sawing, or "wafering" raw quartz with a diamond-impregnated saw blade.

Mother quartz cut into wafers in preparation for preliminary etching for blanks.





This angle corrector tests temperature coefficients to check their fulfillment of high Armed Services standards.



This optical contouring instrument mass produces 15 high frequency crystals for increased activity.

locate the "Z" or optic axis. As soon as this axis has been established, a determination of the cutting angles can then be made and the most economic method of cutting the quartz to eliminate imperfections and obtain the greatest return from a given size can be decided. The use of industrial X-ray is necessary for precise orientation to allow proper alignment of the crystal on the high speed diamond blade that saws the crystal into a series of wafers until the entire raw material has been completely cut. The series of wafers cut from the raw material are too large in this stage and so they are cut into small "dices"; present sizes range from 3/8" x 3/8" to 1" x 1" with 1/2" x 1/2" being the most popular size. The diced wafers are placed on lapping machines and ground to approximately the desired thickness. Each diced wafer or "blank" must be checked for presence of twinning and also for parallelism and correctness of the orientation angle. Accepted blanks must be edged to exact width and length dimensions and then prelapping is required to permit extremely accurate X-ray orientation.

X-rays used during World War II generally permitted orientation accuracy of approximately 3 minutes (plus or minus 3 minutes on repeat readings). Today, precision tolerances required by the Armed Services allow a minimum of plus or minus 2 minutes with repeat readings not exceeding 30 seconds. To meet this requirement, Downing Crystal Company has designed an orientation device which is an integral part of their normal operating process. By the use of this angular correction device temperature coefficient rejects are held to 10% or less at the final test point. A typical test chart, picked at random, shows that of 479 crystals tested, only 6 were rejected because of excessive temperature coefficient.

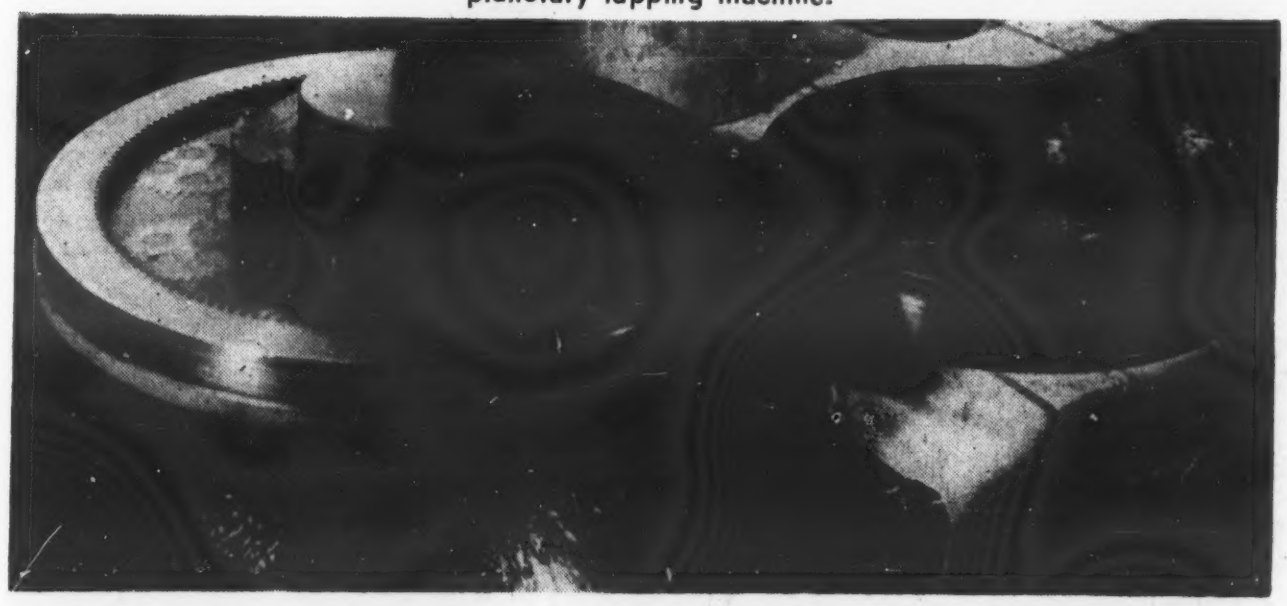
The blank then proceeds through stages of lapping—rough, intermediate, and final. High speed machines are employed with slower abrasive actions as the crystal becomes thinner and thinner. As soon as the lapped blanks approach one or two percent of final frequency they are taken out of the mass production technique and treated as individual items and sorted into small family groups according to frequency relationship and further reduced in the thickness to practically finished frequency.

"Lapmaster" Controls Optical Grinding

At the points of final and finished lapping, especially where higher frequency ranges are sought, optical lapping methods are introduced. Optical grinding methods are used also to control flatness and contour of the final lapping plates. This phase of the manufacturing operation is extremely critical and requires the utmost in skill and precision to obtain the correct flatness or contour of the crystal blank faces. The Downing Crystal Company employs a Lapmaster—a machine that produces surfaces that are optically flat. This is a versatile machine since it is capable of generating surfaces of precision flatness and finish in short runs or in high production quantities. In one cycle, this machine can precision-lap either identical parts or parts of dissimilar shapes and materials. This machine steps up plant efficiency as it reduces lapping costs since there is no loss of production time for replacing or reconditioning the lapping plates. It will readily lap up to the extremely close tolerance of one light band (.0000116") or less. When the Lapmaster is used in the manufacturing of crystals its proper use enables the generation of desired surfaces required for the operation of overtone use.

During World War II crystals were brought to exact frequency by acid etching and electroplating techniques which has been fairly well superseded by the newer technique of base plat-

Fittings for forty 0.5" crystal blanks are barely visible beneath the liquid surface of this planetary lapping machine.



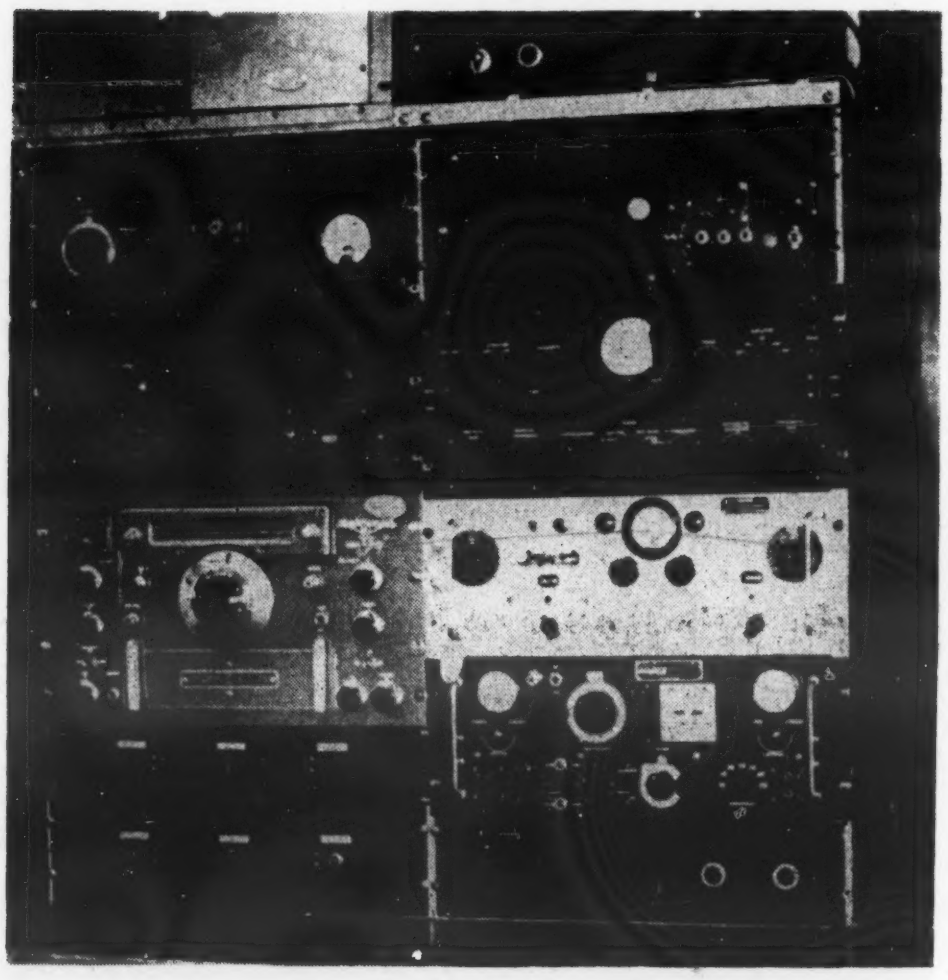
ing followed by spot plating to final frequency. Plating is done at Downing Crystal Company in a vacuum and the close tolerances allowed for the establishment of final frequency is obtained daily in the production of thousands of completed crystal units for military use.

Present day crystals are of the gold or silver plated—wire mounted—soldered in place type mounted within a hermetically sealed can on a glass-to-metal sealed base of standard dimensions which is known as the HC-6/U crystal holder. Both round and square types of crystals are in production at Downing Crystal Company.

New Scientific Methods

Plated crystals are either of the fundamental frequency type of the harmonic or "mode" type of operation. The Downing Crystal Company has become a leader in the development of the third and fifth mode type crystals and the present output of the company consists almost entirely of this type crystal. Crystals in the regular production will actually control frequencies as high as 75 mcs. without the aid of multiplier stages. It is significant that Downing Crystal Company has developed the highly successful normal operating procedure for the manufacture of precision type crystals. Every newest technique practical is thoroughly tested for application in the normal operations of this company to further the precision manufacturing methods. As an example—not satisfied with their present method of crystal analysis, Downing Crystal Company has added a Shadowgraph (contour projector) to their many scientific instruments. This instrument is capable of producing up to 100 magnifications. It is being used in studying surface structures and finishes in order that microscopic scratches, fractures, and imperfections in the edges of crystal blanks can readily be detected. It is possible to use this instrument for crystal mounting alignment which would relieve spring cross tension thus allowing maximum freedom of crystal oscillation.

John W. Downing, Founder and President of Downing Crystal Company.



Precision frequency measurement equipment is the final step in checking the crystal's frequency for conformity with government standards.

Synthetic Quartz by Signal Corps

Downing Crystal Company is one of a select group of quartz crystal manufacturers who is cooperating with Signal Corps Engineering Laboratories in the manufacture of pilot run quantities of frequency control crystals utilizing synthetic quartz. These well shaped crystals are produced experimentally under sponsorship of the Department of the Army Signal Corps. This material represents a new scientific achievement in an area where there has been knowledge of the art of producing synthetic crystals for over 100 years. Progress in the past ten years has been phenomenal. The preliminary operations performed to date by Downing Crystal Company indicate that many of the well established techniques of working natural quartz will be fully applicable in the processing of the synthetic materials. Always interested in the conservation of the sometimes difficult to obtain quartz, Downing Crystal Company is particularly pleased with the lack of twinning and the resultant high yield and low scrap factors indicated up to date. It is hoped that military sponsored programs will be supported not only to enable the continuation of the manufacture of synthetic quartz but also to provide sizes larger in mass than those presently available. To do so will give added impetus to a program that is so essential in case of mobilization.

SUPERCOLOSSAL GADGETRY

D. E. Noble, Vice Pres. in Charge, Communications & Electronics Div., Motorola, Inc. says, "Penny pinching in developmental contracts is a costly, short sighted, false economy."

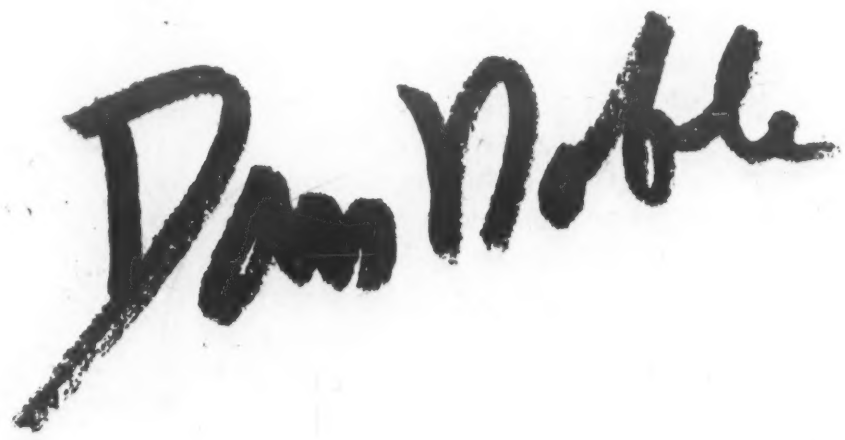
ADMITTEDLY THE SUBJECT OF DEVELOPMENTAL procedure and contract forms is highly complex. Any short commentary is sure to invoke the charge of oversimplification. There is, however, one interpretation of cause and effects applied to military developmental contracts which needs examination under the cold light of logic.

Too much present day electronic equipment fits the category of "Supercolossal Gadgetry." This equipment is too complex, it uses too many tubes, operational tolerances are too tight, it is too expensive to build and it is nearly impossible to maintain. Everyone in military electronics has heard this cry of pain before and my purpose is to analyze one of the factors which tends to produce "Supercolossal Gadgetry."

Experienced engineers know that the first pattern of circuitry and tubes to satisfy a specified set of functions is usually complex. Safety factors may be low and performance may be marginal. First order specifications improvements may be achieved by increasing further the number of tubes and by pyramiding circuit complexity. The path from supercolossal gadgetry to simplified and matured equipment is a long and difficult trail over mountains of successive approximations. In far too many contracts, the mountains are never scaled and the supercolossal gadgetry is delivered and meets specifications. This result is particularly true of fixed price developmental contracts. I suggest that one important contributing factor is unenlightened cost control.

A complex electronic answer to a set of specifications is usually more costly to develop than a simple answer. Six tubes with associated circuitry can be made to satisfy a group of functions more quickly than a simple circuit with three tubes. For emphasis, I repeat that fundamentally it is more costly to develop a simple circuit than it is to develop a complex circuit. Thereby hangs the explanation of some supercolossal gadgetry productions. With competitive bids for developmental work under fixed price contracts with the price at a minimum, there may be insufficient funds to develop and deliver anything but complex equipment. A low priced developmental contract can be the most costly type of contract issued when evaluated in terms of production costs, reliability, performance and maintenance characteristics. Intelligent spending in development can save many millions in production and maintenance; but far more important, such spending can save lives by improving the effectiveness of the equipment in military applications.

Penny pinching in developmental contracts is a costly, short sighted, false economy. There should be no fixed price developmental contracts and competition should be based upon a system of technical qualification merit rating. I would like to see an engineering incentive plan in operation. The organizations which turned out the superior designs would always have the choice of the best contracts. Cost would be evaluated over-all to include production and maintenance. On this basis, the most costly development could readily turn out to be the lowest cost to the taxpayer overall. Remember that it is cheaper to develop supercolossal gadgetry than it is to develop simplified, matured equipment.



Floods and tornadoes demand

Disaster Communications

Naval Reservists worked untiringly in their efforts to alleviate distress in Texas during recent disasters.

FOR THE WANT OF COMMUNICATIONS, a battle against wind and water might have been lost in the Eighth Naval District during May 1953.

First came the battle against wind. Tornadoes struck in quick succession at San Angelo and Waco, Texas. Although the winds did only minor damage to the Training Centers in the two cities, there was a big job for the Navy to do in both places. Read part of a message from San Angelo:

"... ALL STATIONKEEPER PERSONNEL WERE DISPATCHED TO STRICKEN AREA WHEN INITIAL WORD OF TORNADO WAS RECEIVED STATING THAT LAKEVIEW SCHOOL WAS LEVELED WITH CHILDREN PINNED UNDER BUILDING ..."

In Waco, a Naval Reservist sent the first message: "SITUATION UNDER CONTROL, NO HELP NEEDED." The SCR-299 mobile radio unit from the Dallas Naval Reserve Training Center arrived early on the scene. The commanding officer of Waco's Naval Reserve Division set up headquarters in the phone booth of a darkened drug store. Naval Reservists, most of whom were originally members of Waco's Reserve Electronics unit, rendered first aid, assisted in the heart- and back-breaking rescue work and patrolled the downtown area to prevent looting.

Next came flood disaster.

At the U. S. Naval Station, Orange, Texas is berthed the Texas Group of the Atlantic Reserve Fleet. The Naval Station is so situated that if the Naval Station went the whole city of Orange would go as well. At Lake Charles, La., the swollen Calcasieu River flooded hundreds of acres. Highways were closed, civilian communications overloaded.

Upstream flood waters converged downstream; at the same time, unusually high tides from the Gulf pushed water back up the rivers. As one Reservist expressed it, "the Gulf's trying to back up the rivers, and the rivers are trying to get into the Gulf, and something's gotta give."

The something that "gave," but in the constructive sense, was Naval Reserve communications and hundreds of Naval Reservists who volunteered immediately for active duty. Continuous communications were maintained by Lake Charles and New Orleans, La., and Port Arthur, Houston, Beaumont, and Orange, Texas, to handle traffic in the flood area.

LCDR J. E. KEARNEY, USNR, commanding officer of the Lake Charles Naval Reserve Training Center, gives this account: "Wednesday morning, 20 May, the water started coming up pretty fast, and at 1400 that afternoon we alerted the Red Cross. At 1525 we were on the emergency circuit with the Red Cross to handle the local situation around the clock. All stationkeeper personnel were on duty. We maintained continuous radio watch as well as teletype. Our radioman was on the circuit constantly, assisted by the radarman. When either

Naval Reservists from Beaumont, Houston, Port Arthur, Galveston, and Orange, Texas, and Lake Charles, Louisiana, all pitched in and helped put sandbags where they were needed to hold back the water from the Sabine River in Orange.

wasn't on the circuit, he was bailing water.

"Thursday we continued to help the Red Cross until we saw our equipment was in danger and started to sandbag the station. Then we got the message that Headquarters wanted volunteers to go to Orange to sandbag the Naval Station there. In spite of the fact that 75% of the homes of our division members were flooded, 38 men and 1 officer volunteered to go to Orange. We continued to fight water at the Training Center.

"At 2300 Thursday, the Training Center started to flood. Everyone was up all night bailing water and patching leaks, but even at that, two inches of water stood in the Training Center. Ten men came from Orange to help us disconnect all electronic equipment and raise it above the danger level. At that point, we were down to one transmitter, the portable TCS, and we were desperately in need of an additional radio operator. Beaumont sent over W. E. HUGHES, RMC, and F. J. BLAZETH, RMC, to relieve our man, M. W. ANDERSON, RM1.

"We had already notified the Red Cross and civilian authorities that we could handle traffic and welfare messages for them. Roughly 150 messages were sent out Saturday and Sunday morning.

"For four continuous days all the stationkeepers worked around the clock, and we're mighty proud of the boys. Their homes were flooded, but they let their furniture be ruined to save the station.

"Inactive Reserve participation was wonderful, too. More than 15 boys came in to assist at the Training Center. One boy, who lives some miles from Lake Charles, and whose home was flooded out, swam part of the way to the Training Center, waded, spent the night in a church—and apologized for being late when he reported in."

Lafayette, La. (K5NRQ) maintained a continuous radio watch from 22 to 24 May. It was Lafayette which picked up an amateur radio operator's message from the Opelousas naval recruiting substation that 30 life-jackets were needed for rescue workers at Fort Barre, La. The Naval Station at New Orleans provided the life-jackets, the Naval Air Station, New Orleans, flew them to the airstrip at Opelousas. There, they were picked up by the fire chief.

NDF, the Naval Reserve radio station at New Orleans, was on the job constantly from Thursday through Sunday night. One of the many important tasks was handling traffic for the Army Engineers at Galveston, Texas, to the Army Engineers at Lake Charles, La., and New Orleans.

As the welfare messages came out of Lake Charles, there was the job of relaying them. They went to about 30 states, from Connecticut to California. All the stations in the flood area came up each hour to check with NDF for traffic. Port Arthur, although not in the flood area, was up continuously, too. Two of their inactive Reserve radiomen returned to the Training Center so they could maintain a 24-hour continuous watch. In addition, Port Arthur sent a 24-man detail of Reservists to Orange to help with sandbagging the Naval Station there.

Field flood control headquarters, Orange, Texas. This is where all the latest reports were received from the levee where sandbags were being placed. Men on the levee made reports to flood control headquarters, by means of field walkie-talkies, telling them where more sandbags were needed. Field headquarters then dispatched working citizens and Naval Reservists as they were needed.

In Houston, when the message was received that Reservists were needed at Orange, more than a hundred enlisted men and officers volunteered and were rushed to the Naval Station.

When Beaumont, Texas, received word on the morning of 21 May that flood conditions existed in the Orange and Lake Charles areas, the active duty personnel immediately commenced maintaining continuous radio communications with all activities concerned. That afternoon, Reserve communication personnel and others began reporting to the Training Center after the call for volunteer activation of the Reserve Division went out. Watch lists were set up, and personnel were assigned duties commensurate with their rates and skills.

Along with stationkeeper personnel, Beaumont Reservists manned both Naval Reserve and amateur circuits. They communicated with amateurs at the scene of the flood operations in Orange and helped with traffic to persons outside the flood area who could render assistance.

Two Beaumont Reservists LTJG J. G. SHEPHERD (W5RYV) and T. R. LEWIS, EMPC (W5WJI) had mobile radio installations in their personal automobiles. Between watches at the Training Center they went to Orange in response to an emergency call for mobile amateur communications. There they assisted in patrolling the dikes and reporting weak spots in the levee.

These men conscientiously and capably worked long hours. Stationkeeper amateurs W. E. HUGHES, RMC (W5YU) and WILLIAM MURPHY, ET2 (W5LQO) stood by, assisting on circuit watches, handling traffic, and readying the emergency Mobile Communications Unit at the Training Center. The unit was not needed, however, as the situation called for lighter and more flexible mobile units.

Traffic continued on the amateur and Naval Reserve frequencies. On the night of 22 May, a message was sent from Beaumont to the Commanding Officer, Naval Reserve Training Center, Lake Charles, La., offering relief operators for the radioman at Lake Charles who had been on the air constantly since the emergency started. W. E. HUGHES, RMC and F. J. BLAZETH, RMC, volunteered to go to Lake Charles, and drove in a pickup truck through flood waters which covered the highway in many places.

(*Continued on page 70, col. 1*)

SoundScriber Corporation's dictation equipment is found on many assignments, in

Dual Continuous Recorder

CONFERENCE OR COMBAT

A group of New England industrialists and financiers founded the SoundScriber Corporation in New Haven, Conn. and in April, 1940 the company began the manufacture of a new type of dictating equipment. An electronic amplifier was used to record and reproduce the human voice. A plastic disc replaced the old-fashioned wax cylinder as a recording medium.

As a new and revolutionary product, SoundScriber gained immediate acceptance. It filled a long-felt need of many of the country's largest companies for a dictation machine and telephone-recording device.

With the advent of war in 1940, and concurrent production restrictions, SoundScriber continued to manufacture its peacetime product as part of the general war effort. SoundScriber dictating and transcribing equipment was classified as essential, and was supplied to companies furnishing the necessary War Production Board authority for purchase.

The situation continued until the termination of hostilities and the lifting of wartime restrictions. But throughout the war, SoundScriber was called upon by the armed forces to adapt standard dictating equipment to specialized war needs. This was done without a hitch in the production timetable. Recording and transcribing units, built to service specifications, were kept flowing to the Army Signal Corps and to the Navy.

Diversity of Uses

This equipment was used in a variety of ways; to record air-to-ground and air-to-ship messages; communications between friendly forces; enemy radio transmissions for later analysis by intelligence; to examine prisoners and to interrogate pilots after strikes against the enemy; and to record telephone conversations in offices where defense contracts were being negotiated and expedited.

Standard SoundScriber dictating and transcribing equipment played an important role in national defense. It served war industries well. In addition to meeting the needs of general office dictation, it gained wide recognition for its use in war contracts arbitration, in management and production conferences, and in other critical applications where a voice record was of prime importance.

The technical standards for dictation equipment which SoundScriber set as early as 1940—electronically embossed sound grooves on plastic discs, and the use of an electronic amplifier—were proved during the war. They withstood the most grueling applications the war years could provide. They were adopted later, naturally, by the other manufacturers of dictation equipment, and are imitated widely today.

In the emergency period, Government materials restrictions have not limited SoundScriber production. Where nec-

Mr. Walter J. Niles, President of SoundScriber, inspects the SoundScriber plant operation with an employee.

essary, non-critical materials have been substituted without the slightest sacrifice in the quality of the product. SoundScriber research and engineering are moving onward at an accelerated pace. On the technical front, they have kept SoundScriber a decade in advance of its competitors.

The company's main plant, in New Haven, Conn., employs about 350 people. Another 500 people are involved in the SoundScriber field sales and service organization.

SoundScriber products currently in production are: dictating equipment, business and industrial recording equipment. They are adaptable, through various accessories, to the following uses in addition to dictation and transcription: Recording interviews, conferences and public adresses; telephone calls, field reports and investigations. They have proved to be reliable and efficient in virtually any use where recordings of the human voice, or specific sound within an established frequency range, are required.

SoundScriber products are sold nationwide, through distributors located in every major city in the United States and in 23 foreign countries.

Dictation System

A SoundScriber dictation system consists of a recorder and a transcriber. They are two different instruments, because they are totally different in function.

SoundScriber Tycoon Dictator

The major elements of the SoundScriber recorder are: 1. A mechanical drive system, including mechanisms for instant start and feed; 2. Talk and listen back features, including a microphone; 3. Time scale and indexing system, for stylus location and indication of length of letters, corrections and special information—without use of paper strips, or other methods involving additional materials and motions. 4. Electronic system, comprising amplifier controls and recording and playback heads; 5. Put-on take-off and general record-handling features; 6. Special warnings and safeguards to assure freedom from trouble at the transcribing end, with a minimum of attention by the dictator.

The play-back on the recorder is for convenience. It is designed for quick review. Its purpose is to check the last few lines of what has been said. The transcribing instrument is designed solely for play-back by the secretary. It is built for clarity, mellowness and ease of operation. It is one-half of a standard SoundScriber system that is balanced to lighten a dictation work load.

A SoundScriber employee inspects a diamond stylus that embosses sound grooves.

Certain elements of the recorder have their counterparts in the transcriber, which is the end point of a dictating operation. It includes: 1. Mechanical drive system, including mechanism for both instantaneous start and stop, by remote control; 2. Back space, by remote control, for repeating phrases; 3. Time scale and interpretation system, for quick determination of letter length, correction and special information, by an ingenious system of mirrors; 4. Electronic system, comprising the amplifier, listening device and play-back; 5. Special warning and safeguards to assure trouble-free transcriptions.

Since the two machines comprise a system, it was difficult in the beginning, to separate them. Often a feature was provided in the recorder which had no other function than the result it produced in the transcriber. This posed a series of problems, each one of which often could be solved separately. Each solution, combined with other solutions, was coordinated and built into the final equipment. The two machines, therefore, are actually units coordinated into an inseparable pair of efficient business machines. This "system-approach" to the dictation problem eliminated many of the annoyances that previously had plagued the dictation machine industry.

New Disc Size

Moreover, years of practical experience taught, and SoundScriber engineering agreed, that a 15-minute per side disc was necessary for some uses, and that a smaller disc, of mail-chute size, was also highly desirable. Laboratory and field tests disclosed that a 5⅞-inch disc, operating at 33⅓ revolutions per minute, 260 grooves per inch, would give 15 minutes of clear, reliable recording on each side of the record.

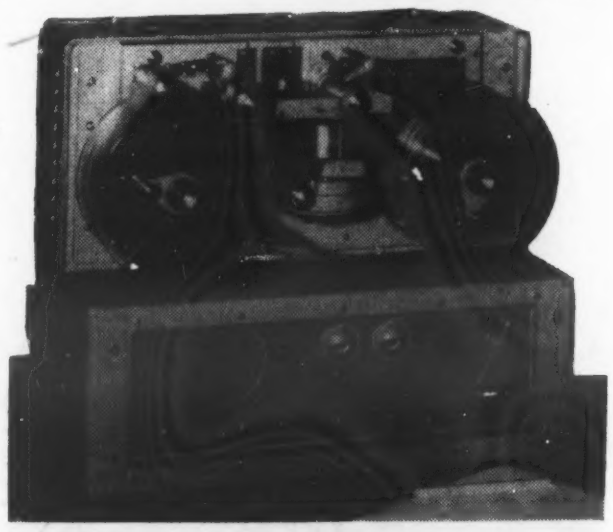
The same calculations revealed that a 3⅞-inch, mail-chute size disc could be used, allowing 7½ minutes of dictation on each side, and a 3-inch disc, with 4 minutes of dictation on each side. These small, long-playing microgroove discs were important, not only to executive's single-letter-on-a-disc dictation and memo needs.

In addition to these departures from limited facilities offered by old-fashioned dictation systems, SoundScriber has built into its newest equipment a number of revolutionary improvements:

Push-button indexing. There are no index slips or paper strips to tax a dictator's patience; all indexing facts are on the plastic disc where they become permanent and assure top accuracy and understandability.

Synchro-light beam accuracy. This makes place-finding easier than ever in dictating equipment. On SoundScriber, two clear beams of light inform the dictator, at a glance, his recording and play-back arm location on the disc.

Two-arm versatility. Two separate



Revolutionary new Magnetic Tape Recorder-Reproducer is SoundScriber newest product. The machine will deliver 24 to 48 hours of continuous, unattended high quality magnetic recording, on one roll of tape, on two channels of communications simultaneously.

arms, one for recording and one for playback, guarantee high quality in both jobs, and provide the widest flexibility in actual use.

These features make SoundScriber the most scientific dictation equipment ever built for general office use. Yet, it was precision engineered to a degree that made it especially adaptable to most specialized uses.

The past several years have seen several new additions to the SoundScriber line of sound-recording products. One of them is a 30-minute and 44-minute dual continuous recorder, which was introduced to provide an efficient and economical method of long-playing, uninterrupted recording.

Aside from the normal demand for this type of instrument, for conference recording and communications' documenting, two leading manufacturers of communication equipment have made it an adjunct to their basic products. It is now being used in military installations. Reports on its commercial applications indicate it will play an important role in the future of American business.

The Dual Recorder is comprised of two machines, hooked together in tandem. A second turntable starts automatically about 14½ minutes after recording on the first turntable, allowing a 30 second overlap. Simultaneous recording on both turntables can be accomplished by lowering both recording arms and starting both turntables.

The Dual Recorder is light—only 32 pounds, and is easily carried. It was designed for locations where space is at a premium.

Unusual features of the machine are time scales and light beams which indicate in quarter minutes the position of recording and play-back arms on the disc surface as an aid to precision logging and place finding. There is also a telephone recording unit inbuilt which acts to equalize the near and distant level of a voice recorded from a telephone circuit.

Other important uses of the Dual Continuous Recorder include the monitoring of police radio communications and fire alarm recording.

The Dual Recorder is SoundScriber's latest effort to meet an increasing business, industrial and professional demand for longtime recording.

Walter J. Niles, SoundScriber's President, is a well-known figure in the office-machine industry. Before joining SoundScriber Corporation in 1949, he was president of Frederick Hart & Company of Poughkeepsie, N. Y., manufacturers of electronic recording equipment. During World War II, he was works manager and general manager of International Business Machines Corporation and Electromatic Typewriters, Inc., manufacturers of office equipment, and with Northeast Electric Co., Rochester, N. Y., manufacturer of automotive equipment.

Mr. Niles has a comprehensive understanding of both marketing and production having been active in both fields in his business career.

Educational Programs

In the field of education, SoundScriber has done much to provide courses in modern machine transcription in colleges, public and private schools and business schools. It has done so in the belief that office routine of the future will be based largely upon the technique of transcribing from the recorded voice to the typewriter. Already a trend in this direction has been seen. A complete revision in secretarial and stenographic courses has been urged by educators. SoundScriber has taken the lead in supplying educational institutions with modern, comprehensive manuals, textbooks and courses in machine transcription.

"Modern Machine Transcription," prepared by SoundScriber, is the most-up-to-date of all such courses. It has been praised for its effective design, its graphic illustrations and its complete coverage of this new subject. Many outstanding business firms cooperated with SoundScriber in making available actual correspondence, which was used as a basis of the course's practice recordings. Thus the content of practice letters in the course have a realism lacking in much textbook material.

The stylus pressure gauge, being used above, measures the pressure of the needle in the groove.

Another SoundScriber special program that has attracted national attention is its Talking Book for the Blind. SoundScriber helped pioneer in this great and humane work. It has brought comfort and happiness to thousands of blind people, of whom there are about 250,000 in the United States.

A Talking Book is a set of SoundScriber records containing the text of a book, recorded in such a manner as to enable a blind person listening to it to obtain everything a sight-reading would reveal. Talking Books on SoundScriber discs are now being made by agencies in three states. The New York Public Library, through its Branch Library for the Blind, has recorded more than 120 books on SoundScriber discs.

Increased sales to the government and military agencies were partially responsible for steeply-mounting SoundScriber sales in 1951 and 1952. Radically new engineering developments, directed toward military requirements in the sound recording field, have jumped SoundScriber's government orders.

Under Walter J. Niles' administration the company forged ahead with unmistakable purpose. The vast engineering, manufacturing and sales progress it has made since Mr. Niles joined SoundScriber Corp., is a measuring stick of the sound policies he initiated and the business leadership he brought to SoundScriber.

Mr. Niles is exteremely optimistic about SoundScriber's role in the job ahead. "We have been able to gather together a group of employees proud of their work and of their workmanship. These people are meeting today the greatly increased demand for our product. We have reason, real reason, to look to the years ahead with plenty of good old-fashioned American optimism."

These gentlemen are making photomicrographs of recording groove structure to assure that the groove is of proper depth for the highest recording quality.

Frank Smith, Photo Editor, reports on

3-D and Wide Screen Motion Pictures

COINCIDENT WITH THE CURRENT upsurge in stereo and wide-screen motion pictures, it may be of some interest to give a brief survey of the subject and to assess some of the various systems projected or now in use.

Today, one is likely to be somewhat bewildered and confused by the wide array of trade names of the various systems such as Cinerama, Cinemascope, Natural Vision, Todd-AO and Vectograph, to mention only a few. Actually, all these may be classified into two basic types—wide-screen and true stereoscopic. The true stereo motion pictures have depth and present a slightly different picture to each eye to produce the depth perspective similar to the way our eyes would see the original scene. In these, a flat screen is used and polarized or colored glasses are required for viewing except for the synchronized shutter wheel system, which uses a rotating mechanical shutter for viewing. The other type merely employs a wide, curved screen and various lenses (except in the case of Cinerama which uses three projectors) to present a panoramic display which gives the illusion of depth. Since a single flat picture is projected, this type is not truly three-dimensional, but achieves the depth effect by occupying a large part of the normal field of vision and no glasses are required to view this type of picture. Summing up, the various types may be classified somewhat as follows:

Wide Curved Screen Types

(*No viewing glasses required.*)

CINERAMA: Uses three synchronized projectors, three 35-mm films, six magnetic sound tracks on film and multiple speakers.

CINEMASCOPE (20th Century-Fox): Uses one standard projector, one wide angle lens (Anamorphoser), one 35 mm film with laterally compressed image, three sound tracks on film, and multiple speakers.

PARAMOUNT: Uses one standard projector, one wide-angle lens, one standard 2-D film, one sound track, and multiple speakers.

TODD-AO: Uses one projector, one wide-angle lens, one 65 mm film and multiple speakers.

True Stereo Types

NATURAL VISION: Uses two standard synchronized projectors, two polarized light films, two 35 mm 3-D films, and multiple speakers. Polarized glasses are required for viewing.

POLAROID VECTOGRAPH (Experimental): Uses one standard projector, one 35 mm Vectograph film with polarized images on front and rear surfaces of the film. Polarized glasses required for viewing.

ANAGLYPH: Uses two standard synchronized projectors, one red light filter, one green light filter, and two 35 mm anaglyph films. Cannot show color films and requires red and green glasses for viewing.

SYNCHRONIZED SHUTTER WHEEL: Uses two standard synchronized projectors, one rotating shutter in synchronism with viewer, two 35 mm films. A rotating shutter is required for viewing.

Cinerama, the system which to date has proved to be one of the biggest drawing cards in motion picture entertainment, is a wide-angle system which uses three separately located 35 mm projectors set 48 degrees apart. The projectors are synchronized to project a three-panel picture (one from each projector) onto a large, wide, curved screen consisting of some 1100 strips of perforated tape. The screen subtends a visual arc of 146 degrees horizontally and 55 degrees vertically, This system, which is not true stereo but rather a wide screen presentation, also suffers from the defect that the system is highly mechanical and complicated, extremely costly, and certain technical difficulties such as lack of synchronism between the three pictures, unsteadiness, etc., remain to be solved.

Cinemascope, which is being promoted by 20th Century-Fox Corp., is the invention of Henri Chretien of France and is basically a curved lens called an anamorphoser, which compresses a wide-angle image onto 35 mm film. A similar unit attached to the projector expands the image for projection.

Another wide screen system, the Todd-AO, which is being manufactured by the American Optical Co. and distributed by Magna Theatres Corporation, consists of a wide-angle lens and uses a single 65 mm film.

The Paramount 2-D system is similar to Cinemascope except that it has an aspect ratio of 1.66 as compared with Cinemascope's approximately 2.5 ratio. The chief advantage of this system is that it allows the use of any standard 35 mm 2-D film, supplies of which are virtually inexhaustible.

In the Anaglyph system, red and green filters are used to separate the two red and green colored images, which comprises the picture. The Anaglyph system suffers from the defect that it can not be used for color and, in addition, a retinal rivalry is set up by the different colors for each eye.

In the true stereo systems such as Natural Vision, there are currently used two projectors linked together, generally mechanically, for the simultaneous projection of the two separate films, the left projector through a filter polarized 90 degrees to the

(*Continued on page 70, col. 1*)

Major Magdalen Crum, Administrative Officer of the SigC Aviation Center, keeps in close touch with all the varied missions performed by the Center by working at her desk and on the flying field as well.

Wings For Wires

The foresight of a small group of men who were aware of the possibilities of small aircraft has mushroomed into a new important facet of United States Army Signal Corps activity.

The Signal Corps Army Aviation Center, originally housed with offices in a small building at Red Bank Airport, celebrated its first birthday July 1.

Today it is a sprawling center occupying the main hanger and several outlying buildings at Monmouth County Airport on Rt. 34. From an original group of 13 military and civilian personnel it has grown to a staff of 186.

Its basic task force of nine Cessna L-19 liaison planes, three De Haviland six-passenger L-20's one twin Beechcraft, two Hiller H-13 helicopters and one Bell helicopter comprise the aircraft operated by the center.

Extensive property is also leased from the airport for aircraft parking and maintenance facilities.

The center was organized to meet the growing needs of Army aircraft in modern military communications, electronics and photography.

For instance, the corps is finding that the H-25 helicopter known as the Army Mule, can be used for such duties as transporting a complete radio station or control tower to a vantage point on a mountain or skipping over impenetrable terrain to set out telephone poles.

Early efforts in the establishment of the center revolved around the work of Colonel Jules E. Gonseth, Lt. Col. Theodore Hoffman and Lt. Col. Eric Osborne.

In addition, pilot personnel during the early stages of development consisted of Captain Frank Cook, Captain Fred Walters, Captain Glenn Darraough, with George Hathaway Jr., and Miss Betty Conrad, Colonel Gonseth's secretary, being the first civilians.

Engineering personnel is active in exploring and developing projects in electronics, photography, navigation, meterology and other subjects closely allied to Army aviation.

The center works in close cooperation with the Signal Corps Engineering Laboratories, civilian contractors, the Signal Corps board and the Electronic Warfare Center, and with all other services handling problems concerning Army aircraft.

Present planning calls for the erection of a laboratory building, helicopter hangar, and shop buildings adjoining the main hangar.

Weekly assignments by the Army Aviation Center show students at the Fort Monmouth Signal School problems in air-to-ground communications, wire laying over hilly terrain, missions in aerial supply and message drops and pickups along with photo missions.

Another job performed is flying aerial photography students on missions. In such missions a point of interest is selected to be photographed, its location radioed to an Army Aviation Center plane and the

picture taken. The negative is dropped to the ground to the photo laboratory and processed in a matter of minutes.

An L-20 DeHaviland Beaver airplane carries television camera equipment and televises to a ground station pictures taken in flight.

Of a more spectacular nature, now undergoing test and evaluation at the Signal Corps Army Aviation Center, is one of the most versatile tools used by the Signal Corps. It is the Piasecki H-25 helicopter, popularly known as the Army Mule. This unique aircraft can perform a variety of duties, many of which would make an old time corpsman wag his head in wonderment.

The future will soon see the end of Signalmen slogging through underbrush and up the precipitous sides of mountains, exposed to long hours of enemy fire to set up radio stations. The back-breaking struggle of packing heavy supporting supplies to difficult locations is being lightened by this use of modern methods.

The saving in time and lives that will be effected by the use of helicopters for this mission alone is immeasurable. At speeds up to 80 miles an hour, complete Signal Corps radio stations will be whisked to operating positions. The miracle of speed of communications provided by radio is not being denied the Army while foot soldiers have to struggle against difficult odds to reach suitable sites for radio stations.

Another mission that the Aviation centers' helicopters have taken into the air is the erection of telephone and telegraph lines. Telephone poles can be lifted from the supply point by cable underneath the helicopter and carried through the air to the point of implacement. They are then lowered to the holes in the ground. Poles can be set out many times faster than the conventional methods, and without the necessity of operating heavy equipment through difficult areas. Particularly pole lines can now traverse ground unsuitable for carrying the weight of heavy trucks. Crews to dig the holes can be flown in by helicopter with portable augers, thus preparing the way for the H-25 to lower the poles.

Entire lines when constructed can be serviced from the air, the slow flying Army Mule permitting close inspection. Crewmen can be lowered to otherwise difficult locations to make repairs.

In order to connect two stations by wire or cable in the shortest possible time without the use of poles the H-25 can make a reconnaissance flight over the proposed path noting road and rail crossings, power-lines or other obstacles that would cause damage to the wire. The flight is then made from point to point, the H-25 dropping the wire at speeds up to 80 miles an hour, connecting the two stations. The use of cable as a means of communication is being developed and advanced even with the known advantages of radio transmission, due to the fact that the directly connected telephones provide a more private and interference free means of communication.

The aviation center is the first to use a new and unique navigational device in a helicopter. If proven successful and accepted by the Army, it will add a sixth sense to the already versatile helicopter. This feature provides the Army Mule with the uncanny ability to know its exact location in space, any time regardless of weather conditions.

With distance measuring equipment the helicopter will be able to locate itself with reference to a ground station. In conjunction with radio range equipment it will then be able to fly to the landing area. With a ground station located at an airport the helicopter can fly unerringly to a safe landing.

However, the Signal Corps use of helicopters is still in its infancy, and as personnel become more accustomed to the varied capabilities of these new aircraft its uses still become manifold. Already helicopters are being put into use. The H-21 Piasecki helicopter, with a 14 to 22 seating capacity, will be used to lift even heavier loads.

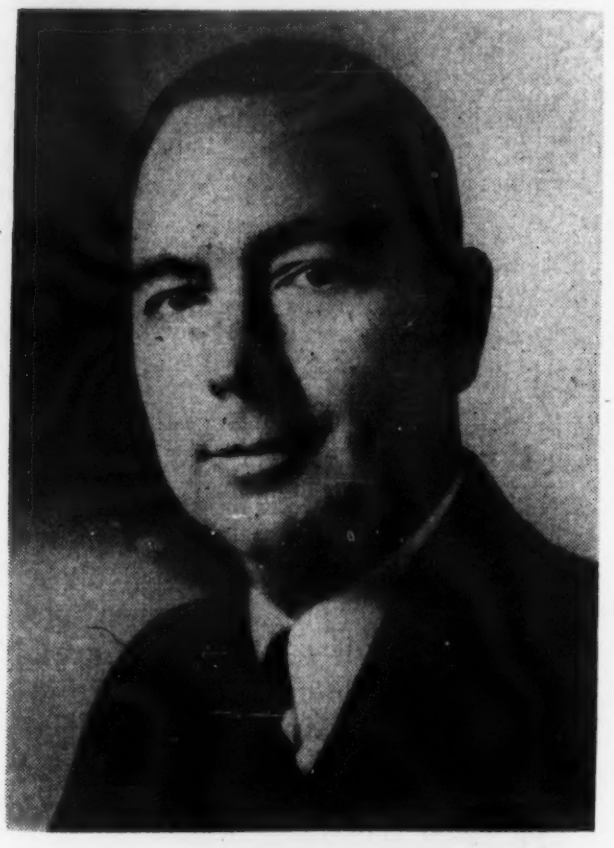
As mechanized units replaced cavalries, and jeeps and half tracks surplanted the early auto, helicopters such as the H-25 have now lifted the many missions of the Signal Corps above the earth, away from the delays, hazards, and slow pace of ground transportation. For the Signal Corps, helicopters are a new way to get there firstus with the mostus.

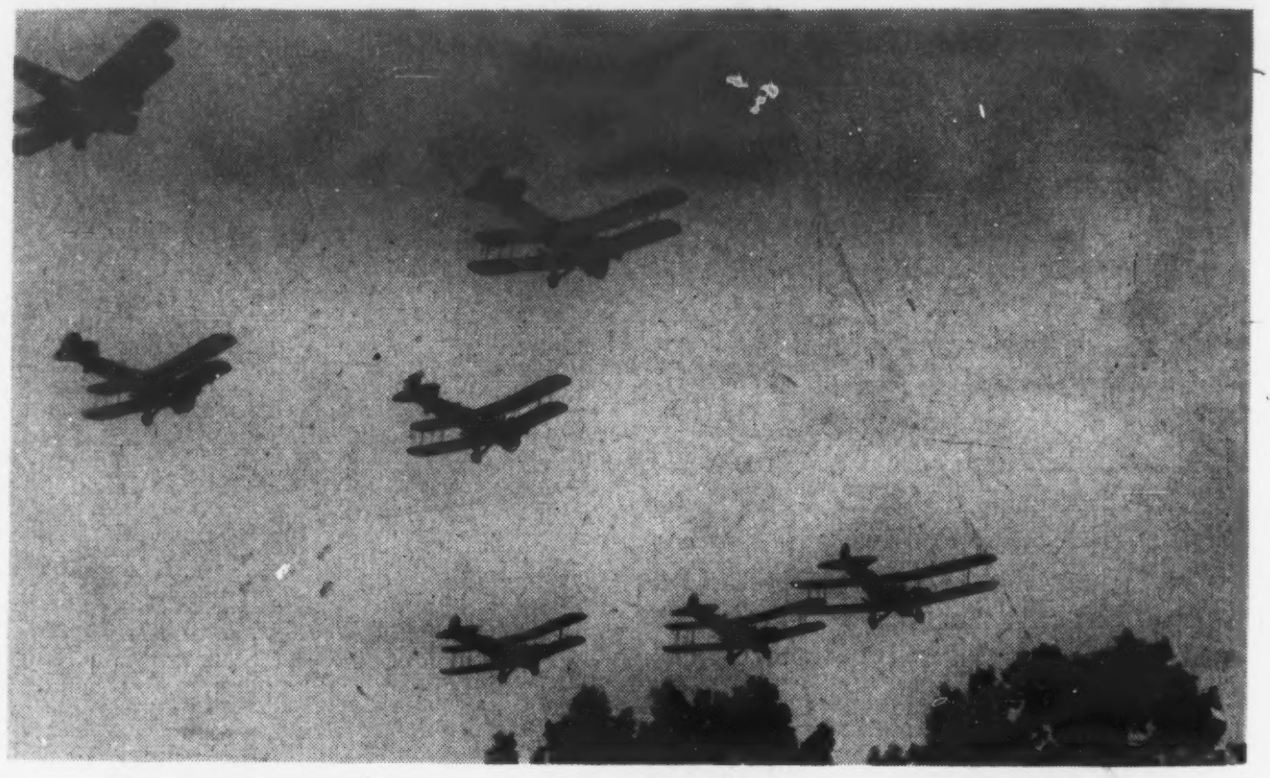
During Armed Forces Day celebrations at Ft. Monmouth, helicopters from the Center performed for military and civilian spectators.

Major General Kirke B. Lawton, Commanding General of Ft. Monmouth, co-pilots a new H-19 helicopter at recent demonstrations at Greeley Field, Ft. Monmouth.

Newspapers represent that field of *communications* in which the exchange of news and ideas is a daily operation. *Electronically,* facsimile equipment is constantly used in expediting the transmission of photographs and copy. To illustrate the newspaper's position in *photography,* Mr. John A. Shipley, staff photographer on the *Baltimore News-Post* for 32 years, has chosen these pictures from his collection and written the captions to describe some long-forgotten events that were newsworthy in their day. Mr. Shipley's photography has been rewarded through the years by numerous prizes and top assignments.

The *Baltimore News-Post*, a Hearst publication, has been an active member of the AFCA and the Baltimore chapter since its chartering in 1948. Pictured below is Mr. Fred I. Archibald, publisher of the paper, who was recently appointed to that position following the death of Mr. William Baskerville.





This photograph was taken during an Army Review at Fort Meade, Maryland in 1932 of planes flying in formation. These "flying crates" were really tops in their day.

BALTIMORE

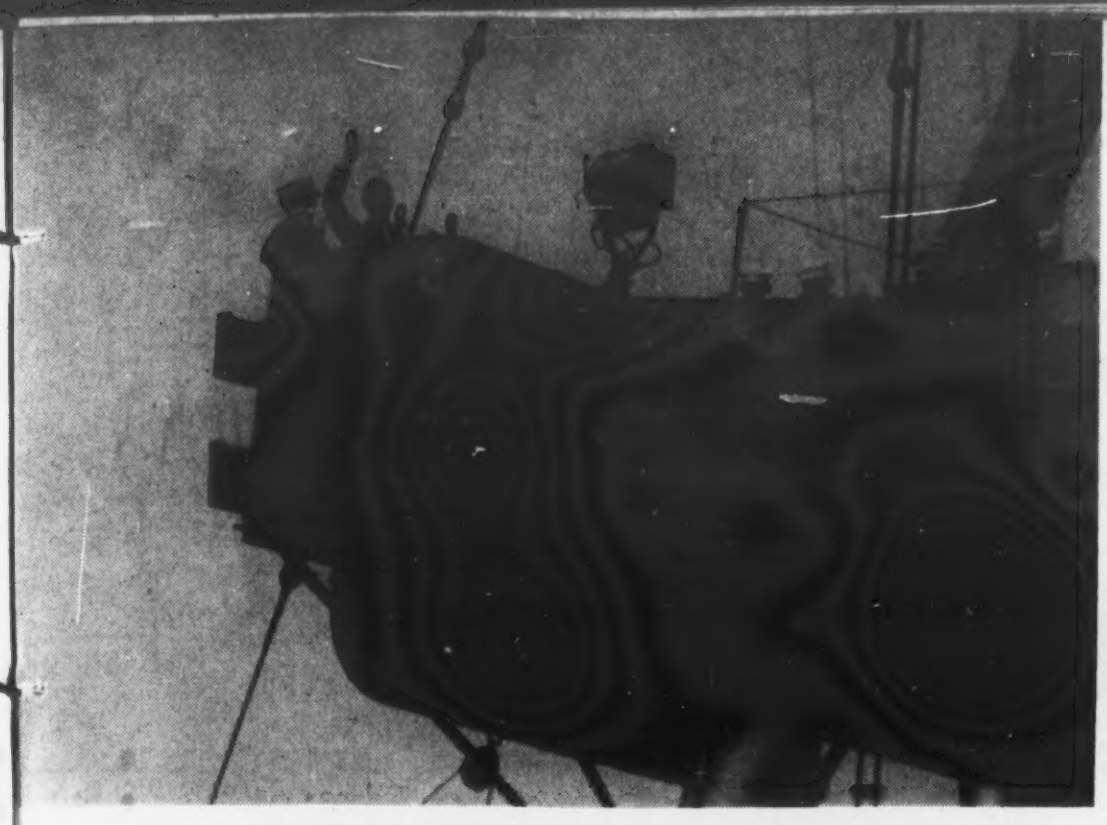
AN INDEPENDENT

THE

The ferry boat, Philadelphia, or "Smoky Joe," breaking ice in the Chesapeake Bay between

Love
This
The

The only mule pack in the country starting on a hike! The 4th Field Artillery of Fort Bragg, photographed in February, 1942, packed their artillery on the mules and started on maneuvers.



Charles Lindbergh on the bridge of the cruiser Augusta on his return from Europe after completing his solo flight to Paris. The picture was made from a speed boat on the Potomac River below Washington, D. C., with a telephoto lens. That same day in 1927, Lindbergh received a decoration from President Coolidge.

When his plane made a brief stop at Baltimore in 1932, Will Rogers was interviewed by many reporters.

THE NEWS-POST
NEWSPAPER

ia, ice een

Love Point and Baltimore—February, 1934. This allowed other shipping to move, too. The temperature in the plane? 8 degrees!

Match race of the century at Pimlico Race Track in Baltimore—1938. This prize-winning photography shows Seabiscuit on the rail winning over the only other horse in the race, War Admiral.

VHF Systems in Korea

by

Captain Eugene J. McElroy
USAF

THE KOREAN CONFLICT gave VHF/-FM systems new and added importance within the communications family. With the advent of television, the widespread use of VHF for telephone relay was discontinued. Present communications practice has been to utilize ultra high and microwave frequencies for telephone relay. During World War II, large quantities of VHF relay equipment were produced for the Armed Forces since the light weight equipment, easily portable and highly dependable, was ideal in tactical situations. However, upon the cessation of hostilities the equipment rapidly became obsolete and its use within the continental limits of the United States was discontinued completely. Limited quantities continued to be used in overseas theaters. The VHF/FM radio link had become a war orphan relegated to storeroom shelves, stock piles, and overseas installations.

The VHF system consists of three major components, a transmitter, a receiver, and an antenna system. The transmitter is a crystal controlled unit capable of single frequency operation on any one of 300 channels in the 70 to 100 megacycle range. Either 10 watts or 40 watts of output power may be selected on any frequency. Phase shift modulation is utilized exclusively.

The companion receiver is a single channel, crystal controlled, double-conversion superheterodyne operating on any preset frequency in the 70 to 100 megacycle range. It is designed to receive FM signals having a maximum deviation of plus or minus thirty (30) kilocycles.

The antenna system normally utilized with this equipment is a three-element adjustable Yagi. It consists of a single driven half-wave dipole, one director, and one reflector. A fifty-foot mast is supplied with this gear.

The equipment just described is utilized here in Korea in either a terminal or relay application. In terminal applications the input of the transmitter and the output of the receiver is connected to the terminal carrier bay for connection to the switchboard. In relay application the output of a receiver is connected to the input of the transmitter and automatic relay is accomplished. These circuits are arranged for duplex operation at both the terminals and the relay sites. Two transmitters and two receivers are used for each circuit at the relay points. Normal relay installations carry approximately nine circuits per relay, a total of eighteen operating transmitters and receivers per relay site. FM receivers, by design, are wide band instruments and, as can be expected, adjacent and cross channel interference becomes a serious problem. This interference problem is aggravated by the increasing amounts of equipment in use by the Army, Navy, Marine, and Air Force in this theater.

Elimination of interference is one of the major problems at each installation. The ideal solution, of course, would be careful selection of frequencies, but with frequency utilization at a maximum, increasing emphasis is placed on careful transmitter and receiver tuning and orientation and placement of antenna systems. By careful tuning and painstaking antenna placement experimentation, twenty-three separate transmitters and receivers have been placed in operation at one location without interference.

In Korea the normal problems encountered in the establishment of a radio site are increased one hundred fold by the military situation. Manufacturers, the Military, and Communications Companies procedures for establishment of similar VHF radio

Figure 1

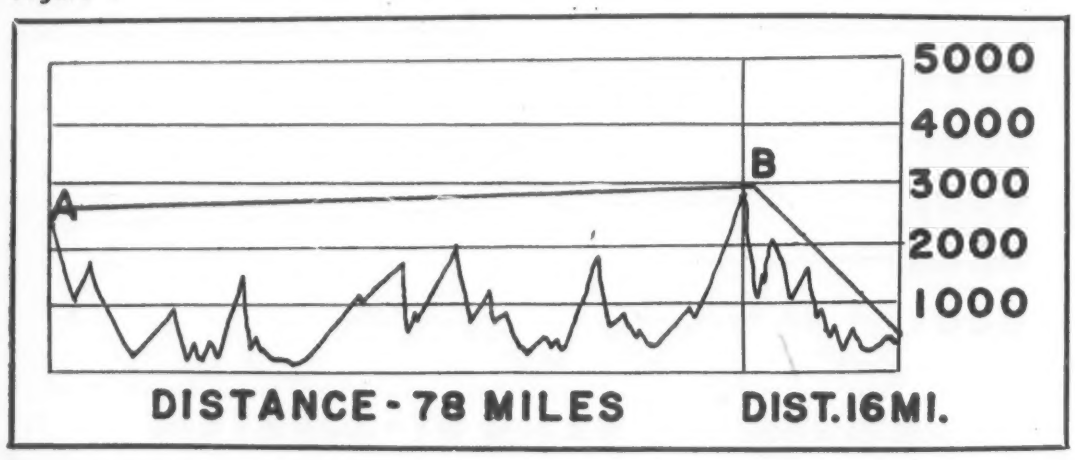
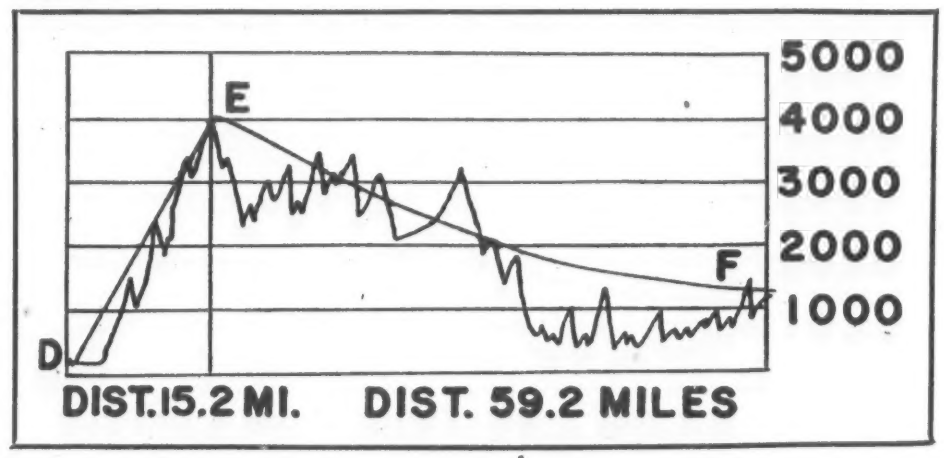


Figure 2



relay stations require stations to be located at approximately twenty-five-mile intervals with adjacent relays having normal line-of-sight capabilities. The instruction manual accompanying this equipment states that accessibility of a proposed site and a good transmission path are equally necessary. When choosing a location, it cautions, access by vehicles to supplies of gasoline, water, oil, food et cetera, should be considered. Naturally the primary consideration upon which the installation of radio relay sites in this theater was based was military necessity, and as a result the actual site locations vary considerably from the ideal recommendations of the industry.

Four of the relay sites are located on mountain tops inaccessible by vehicle, all equipment and supplies must be hand carried from a base camp to the actual relay site. This requires on the average a two- to four-hour climb by a loaded porter. At these locations buildings, equipment, and power units had to be disassembled and carried by back pack to the relay site. Such sites must be completely self sufficient and actually are miniature communications corporations. In addition to the operating personnel, cooks, aid men, maintenance men, power technicians, and Air Policemen are assigned to the sites. Guerrilla attacks are not infrequent and all personnel are expert marksmen.

Instead of the ideal twenty- to twenty-five-mile line-of-sight span between relay sites the average distance between relay sites is from fifty to sixty miles with the extreme approaching one hundred miles. Line-of-sight in Korea is a condition to be desired but in actual practice seldom found.

The author hesitates to draw any inflexible conclusions as to the maximum reliable circuit paths and of the value of line-of-sight propagation, but to say the least, the result experienced here over extended ranges, violating known line-of-sight theories are startling. Experience gained with VHF/-FH equipment in Korea over a two-year period indicates that 100% reliable communication can be carried on over approximately eighty-five ranges even though line-of-sight signal paths cannot be achieved.

Field strength tests are conducted by measuring the first limiter grid current of the receiver. A built-in meter circuit is used to accomplish this. The 0-100 micro ammeter has the current indicating range doubled when measuring the 1st limiter grid current, this limiter grid current is

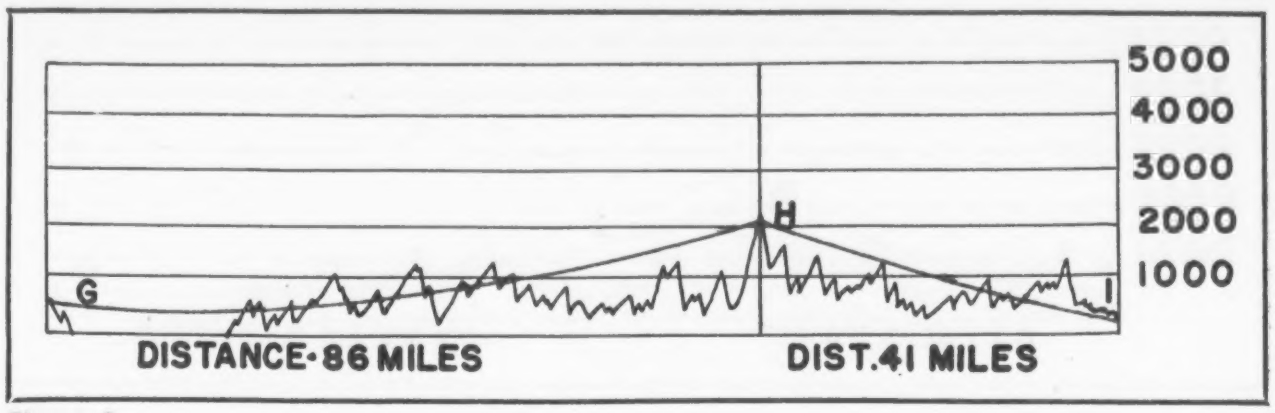


Figure 3

the signal strength reading referred to in the following paragraphs. An arbitrary *scale* reading of 50 microamps has been selected as the lowest reading that will enable 100% reliable continuous operation. Actually a considerable margin for error has been included.

The profile drawings of typical signal paths used in working circuits illustrate the conclusions drawn above. Figure 1 is a profile drawing of a clear line-of-sight "shot" of 78 miles and another of 16 miles. The elevation of each point can be determined from the height scale at the right. The signal strength readings measured at the first limiter grid in the manner detailed above are as follows; from A to B, 90 microamps on the meter, from B to C, 92 microamps. Figure 2 contains both a clear and a blocked "shot." It is interesting to note that the signal strength of the blocked shot from E to F is 86 microamps and is higher than the shorter clear shot from E to D of 70 microamps. Figure 3 illustrates one of the longer signal paths contrasted with a medium distance relay. Note again that the line-of-sight paths for both relays leave much to be desired. Average signal strength readings for both relays are the same, 80 microamps. Figure 4 illustrates medium distance paths. both line-of-sight and blocked, in both cases the signal strength readings are the same, 95 microamps.

The signal strength readings are average readings compiled over a thirty-day period and the author desired to emphasize again that the signal strength figures referred to are indications only of relative signal strength, made on the actual receiving equipment.

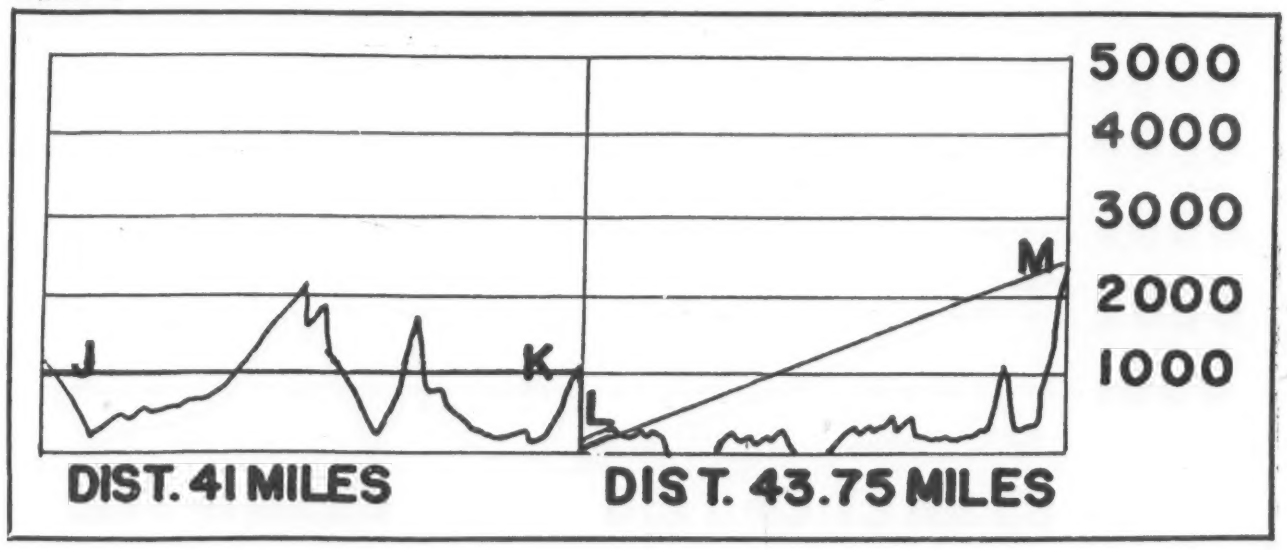
The above remarks relative to the unusual non line-of-sight propagation encountered in Korea, namely propagation beyond the line-of-sight ranges, propagation over signal paths where natural obstacles, mountains, etc., obstruct the signal, and combinations of both of the above listed conditions, should not be construed as a refutation of known theories but rather as a correlation of line-of-sight with other additional propagation factors. The factors of reflection, ducting, diffusion, dispersion, and inversion have been neglected in the discussion due to the difficulty of measuring and assessing their influence. It is assumed that the phenomena encountered are of a relatively permanent nature, since reliable operation has been carried out now in excess of two years. After all, they do call this "The Land of the Morning Calm."

In actual operation a telephone call placed from Seoul, Korea, to Japan would go from the Seoul subscriber through the switchboard to a carrier bay, emerging from the carrier bay as a 30% modulation portion of the carrier envelope, it would be carried by cable several miles to the Seoul VHF/FM terminal. The call is then carried through radio relays into a southern Korea terminal. Thence to Japan via a relay located on an island in the Japan Sea.

The men who operate this equipment (and the author includes himself in that category) have learned

(*Continued on page 70, col. 2*)

Figure 4



"I Remember . . ."

In September, 1908, this letter to telegraphers in New Zealand appeared in The Katipo, telegraphers' official monthly magazine. The travelling correspondent, Alfred Mayne, describes conditions of telegraphers in Europe and America at that time. Their fascinating history was preserved in the files of Rawson E. Stark, author of last month's "I Remember . . ." article.

SINCE LAST WRITING I HAVE HEARD quite a lot from old-colleagues in the Colony who are interested in wireless telegraphy. I was pleased to see that the notes I wrote you from Berlin and New York were so much appreciated, so am sending you some further jottings, which I hope may also prove of interest.

I have been able more or less to keep myself in touch with the latest developments and improvements that have taken place in wireless. After quitting the big German "Telefunken" Company in Berlin, I went to Paris. There I joined the "Popp" Company, and was connected with various experiments at the Eiffel Tower, and elsewhere. Subsequently, after several more years spent in Spain and other parts of Europe, learning the languages, and seeing everything to be seen, I came over here to the United States to take up an assignment in the laboratory of Professor Fessenden, one of the foremost scientific men in the world working on wireless. You will see that I have kept myself pretty well in the forefront of the profession. At present I am carrying out important investigation work, and have just returned from a lengthy tour of the West Indies and Mexico.

Financing Wireless

There is no fake about the progress which wireless is now making. The various exploiting concerns have, so far, perfected their apparatus that they are now able to offer and guarantee a service almost as reliable and effective as land lines, and generally faster than submarine cables. Indeed, competition with existing land wire systems has already been successfully established, but it has been found unprofitable to enter into competition with the two controlling land line interests in this country.

Wireless has to a certain extent, however, fallen into considerable disrepute owing to several causes; one being the inability of Marconi and certain other inventors to make good their yarns, and another that wireless fell into the hands of the unscrupulous company promoter. The promoting of wireless companies has proved a real gold mine to certain individuals of this type. They have managed to foist on the public over 80,000,000 dollars' worth of wireless stock during the last eight years, and this is so valuable now that it is not even quoted on the market. Abraham White, president of the De Forest Companies, engineered about 20,000,000 dollars of stock on the public, but the only De Forest Company which is making any money is the one known as the Atlantic De Forest, which, however, is practically White's own private property. He recently endeavored to bring off another big job, viz., the amlagamation of the various systems under the name of the United Wireless Company — capital 30,000,000 dollars. It did not come off, however. Undoubtedly, a combination of the different companies would greatly strengthen their hands, enabling them to offer a system including the best points of each, and doing away with competition and breaking down Government monopolies.

One of the greatest difficulties encountered has been the question of licenses. Practically every country has made wireless a Government monopoly, and object to granting concessions, so the private companies do not get much of a chance. You would have had wireless out in your part of the world long ago if it had not been for this obstacle. In Europe the same state of affairs exists. At Brant Rock, Mass. (Western Trans-Atlantic station of the Fessenden system), we established undoubted reliable communication right across to Scotland, but were unable to obtain a franchise from the British Government to transact commercial business. As the cable rate between the United States and Europe is 1s (shilling) per word, which the wireless can easily reduce by half, there is going to be a big thing for the companies when they do eventually get a start.

Conditions in the United States

In the United States, on the other hand, no such restrictions exist. There are probably 300 stations in active operation in various parts of the Union, exploited by some half a dozen different interests. The U. S. Navy, which, after very exhaustive tests, adopted a composite system embodying Fessenden, De Forest, and Telefunken parts, have a very extensive system of land, long-distance and floating stations. Since the strike of Telegraphers has been on they are transacting a very considerable amount of their official telegraph business by wireless. They have long-distance outfits communicating direct from Washington to New York, Boston, Key West, etc. The Atlantic squadron is continuously in direct communication with Navy headquarters, Washington, over a distance of 100 miles land and various distances at sea. The flagships are equipped with long-distance outfits, and thus act as relay stations to other ships of the fleet, which are equipped with normal outfits only.

The U. S. Navy offers very good in-

ducements to wireless operators. Pay starts at £7 a month, all found. The men join as electricians, and are usually very rapidly promoted as Chief Electricians to charge of a ship or shore installation at £15 a month. Term of service is four years. The Revenue Service and Signal Corps of the U. S. Army also offer good wages to operators. (See note at bottom of column for comparison of dollars and pounds.)

Jobs and Salaries

In fact, in this country there are plenty of openings for all kinds of Telegraphers. The railroads are always wanting men. Pay, as a rule, however, is by no means extravagant, as you will no doubt have deduced from the operators' strike now general all over the country. Railroad operators get about £10 to £14 a month, and commercial operators about £5 a month more. The little I have seen of telegraphs since leaving New Zealand leads me to the opinion that an operator out there is a great deal better off than his colleague in most other lands. His social position is certainly far better anyway. I contrast in my mind's eye the appearance of the well-fed and haughty-looking aristocrats of the key in Wellington with the 1000 subdued individuals I recently saw in the great C.T.O. in London, England.

There is quite a demand for mercantile wireless installations just now, and has been since the accident to the New York passenger steamer "Ponce," which broke her shaft, and was lost for several weeks. The Atlantic De Forest Company, which is securing the bulk of the business, cannot equip ships fast enough. Practically every coasting steamer of any importance, and also river and lake boats now carry wireless. Even oil barges and sea-going tugs are being fitted up, and now it is possible for a shipping man to 'phone the wireless office on the roof at 42, Broadway, and have an answer from a ship 100 miles at sea "while he waits."

Steamboat captains find the wireless a great convenience, as they are able to keep in touch with their offices for hours previous to arrival, or after sailing. A few weeks ago the De Forest Company secured a big advertisement, and also demonstrated the great usefulness of wireless by equipping the Press yacht at the Newport, R.I. yacht races. Newport is about 100 miles from New York City, the yachtmen were kept advised right up to date concerning all market prices, etc., direct from Broadway.

By a pre-arranged code of signals the Pressboats communicated again with the yachts. Fortunately, thanks to improved methods of tuning, no interruption from other systems was encountered, and so there was no fiasco from this cause, as happened four years when Lipton tried to lift the Cup.

It has been very common lately for shipping to be held up by fog outside Sandy Hook, and on these occasions anxious passengers rapidly enrich wireless revenues. The De Forest station at 42, Broadway, some times handles thousands of messages per day. Ships sailing to the West Indies, Mexican, and South American ports are practically in touch with land the whole journey nowadays, either direct or by relaying. The usual installations employed on board ship are of the K.W. This is what is known as a normal outfit, and is good for about 150 or 200 miles, under ordinary circumstances. Flagships of the U.S. Navy, however, are more powerfully equipped, and communicate sometimes over distances of 1000 miles and more. In this case, about 10 h.p. is required. There is a regular chain of stations along the Atlantic coast. Some are privately owned, and others are run by the Navy Department. The latter accept work from ships when there is no private land station in the vicinity. A steamer on the run from New York to Havana would communicate first day with New York and Atlantic City, second day with Cape Hatteras, third day with Florida Coast stations, and last day with Key West and Havana. Trans-Atlantic boats operate with land stations on short distance apparatus for first two or three days, afterwards receive Press news on a regular schedule at night from high-power transmitting stations in America and Europe. The daily newspaper is now an established feature of ocean traveling. It is usually brought out for breakfast and consists of short bulletins relating to current events, market quotations, etc. The De Forest "Herogram" appears in the form of a pamphlet of about 20 pages, mostly already printed, but with several blank pages for the wireless news to be added at sea. This is typewritten and mimeographed, and the paper sold at 10 cents.

Wireless Operators on Ships

The life of a wireless operator has a certain amount of attraction. Operators on American ships are better treated in many ways than those working for the Marconi Company. Marconi operators must go through a lengthy course of training, and are then started on board ship at 10s a week. American operators do not require any training, and begin usually at £8 a month. As they are very often bright chaps, it is no uncommon thing for an operator to add another £20 a month to his salary in various ways—such as representing business houses, acting as agents for hotels, etc. On the whole, the operators seem to have easy jobs. Some of the West Indian trips during the winter season offer a really delightful holiday. A run to Puerto Rico by mail-boat, for instance, hardly suggests the strenuous life, seeing that the voyage out occupies only four days and the ship stops twelve days at the island, during which time the operator has nothing at all to do. Other interesting localities an operator has opportunities of visiting are Havana, New Orleans, Panama Canal, Venezuela, etc., as well as a number of Home ports. Steamship people on the Pacific side are also becoming interested in wireless, so that the field will shortly be widening.

Modern wireless outfits are in no way complicated, and the running of an installation is soon picked up by any Telegrapher. The whole thing takes up very little space, and, in fact, on board ship an ordinary stateroom is very often all that is available for wireless purposes. The operator sleeps in it as well.

One such that I saw a few days ago might bear description: The upper berth was taken down and a shelf substituted; on this were the three K. W. transformers and condenser of twelve Leyden jars. On the floor at one end of the room was a one K. W. A. G. motor generator, over which was fixed a table. Washhand-stand was at the opposite end and a door and window on remaining side of room. A motor-starter and the few switches necessary were attached to wall over the table, and the tuning coils, automatic responder and telephone were ready to hand on the table itself. Generally, however, a special wireless house is built on the boat deck. Some of these, especially on the big German liners, are much more elaborately equipped, and consist in several cases of suits of three and four rooms. On the "Kaiser Wilhelm II," the operator is provided with a suite of four rooms, all elegantly furnished.

Equipment Operation

The method of working a wireless outfit is simplicity itself. The operator listens to see if all is clear, then starts his motor generator, alternating current, and gets to work with an ordinary telegraph key in the usual manner. He can send as fast as he is able, so long as the "reception" is good. In receiving, of course, no power is required. Signals are read with ordinary head telephone of high resistance. This is work requiring a considerable amount of skill, especially when covering long distances, as the "sigs" gradually lose strength with distance until they fade away altogether. Usually ships have a "listening-in" schedule, so as not to keep the operator on duty all the time. Of course, if the operator has not the telephone to his ears he does not know when he is called, so he listens in every four hours, or whatever the schedule may be. Land stations are generally in

(*Continued on page* 70, *col.* 2)

Note: According to information received from the National City Bank of New York, New Zealand pounds were quoted on the London market in 1908 at $4.87 per pound. £15, in American currency, was $73.05.

From the President

President Redman makes a plea for continued growth in AFCA membership, pointing out that the objectives of the association can best be met by a large and active group of chapters and individual members.

Another summer has now passed into history, and much of its history will long be famous. Some may eventually call it infamous, but in any eventuality, three years of death and destruction have been brought to a standstill for at least a 90 day period. What will occur after that time can not now be projected, but we all hope for a lasting *truce* that will merge into a lasting *peace*.

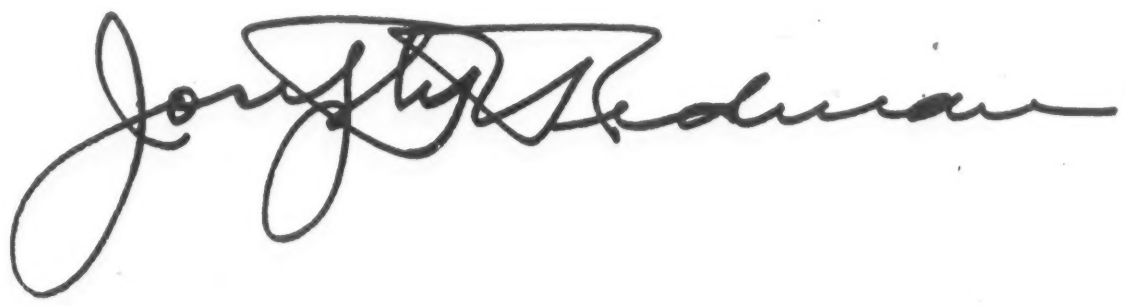
But, because we have no guarantee that peace will come so soon, our efforts toward our national defense preparedness must not slacken. This task of national preparedness is a necessary one, now more than ever before. The processes of research and the development of new and better equipment will continue, and will maintain our position as world leaders in electronics.

Our organization, the AFCA, is dedicated to national preparedness. Our purpose is to bring the military and industry together to achieve a better understanding and knowledge of each other's problems. Through chapter meetings, national conventions, and our magazine, SIGNAL, ideas are developed and exchanged which establish a mutual knowledge of communications, electronics and photography.

In order to continually strengthen the Association's prestige and merit, a steady growth in membership and circulation is now more than ever essential. Each of us should fulfill our duty to the AFCA by bringing in more members. Every chapter should establish a goal of one *new* member for each active member now on its rolls.

Inform your friends of the objectives and functions of AFCA and bring in *your* new member! Informational material is available at chapter and national headquarters.

1952 was a good membership year. Make 1953 an even better one!



Association Affairs

1954 AFCA CONVENTION COMMITTEE

Plans for the 1954 AFCA Convention to be held May 6th through May 8th in Washington, D. C., are well under way.

Colonel Percy G. Black has been appointed Convention Chairman by Thomas Jacocks, President of the Washington Chapter, with the approval of Admiral Joseph R. Redman, National AFCA President.

The Steering Committee, composed of Colonel Black, Thomas Jacocks, F. H. Engel, John Gilbarte, and B. R. Olmsted, met on July 30th. The following Convention Committee Chairmen were approved by the group: Colonel Percy Black, General Chairman; Francis Engel, Program; Wilfred L. Peel, Finance; Thomas D. Blake, Publicity; James K. Tully, Transportation; Leslie Alberici, Hotel Reservations; and Mrs. Joseph R. Redman, Ladies Program.

Convention headquarters are to be at the Shoreham Hotel and the tentative program covers many new and interesting activities. Further news of Convention plans will appear in the next issue of SIGNAL.

SIGNAL CORPS ASSIGNMENTS

Colonel Francis F. Uhrhane, who was formerly assigned to the staff of the Chief Signal Officer in Washington, has been named commanding officer of the Signal Corps Engineering Laboratories. Colonel Uhrhane succeeds Brigadier General Edwin R. Petzing as head of the laboratories. General Petzing was recently named Chief Signal Officer in the European Command.

Colonel Marlin S. Moody, former Commandant of the Signal Corps Training Center at Camp San Luis Obispo, California, has been appointed as Signal Officer for the Fifth Army with headquarters in Chicago. Colonel Tyree R. Horn, under whose leadership the Fifth Army Signal Section successfully concluded development of the first fully automatic teletypewriter, has assumed duties at the Pentagon as Inspector General for the Signal Corps.

Brigadier General James S. Willis has replaced Brigadier General W. Preston Corderman as Commanding General of the Signal Corps Supply Agency. General Corderman is now assigned to the Office of the Chief Signal Officer.

Cadet Max W. Noah is congratulated by Donald F. McClure after being awarded the AFCA prize at West Point.

AFCA National President Joseph R. Redman presents the award at the Naval Academy to Midshipman John Endlich.

Service Academy Awards

The association's annual awards at Annapolis and West Point this year were donated by the RCA Victor Division. Consisting of RCA Victor Personal Clock-Radios, they were furnished through the courtesy of W. W. Watts, RCA Victor vice president and immediate past president of the AFCA.

The award at the Naval Academy to the graduating midshipman having the highest standing in the electronics course was won by John Endlich of Floral Park, New York. The presentation of the prize was made by Rear Admiral Joseph R. Redman, USN (Ret.), national president of the association.

The Military Academy prize for the highest rating in the study of electricity was awarded to Max Wilbur Noah of Milledgeville, Georgia. New York Chapter President Donald F. McClure presented the award in the name of the association.

Signal Corps ROTC Summer Camp Award

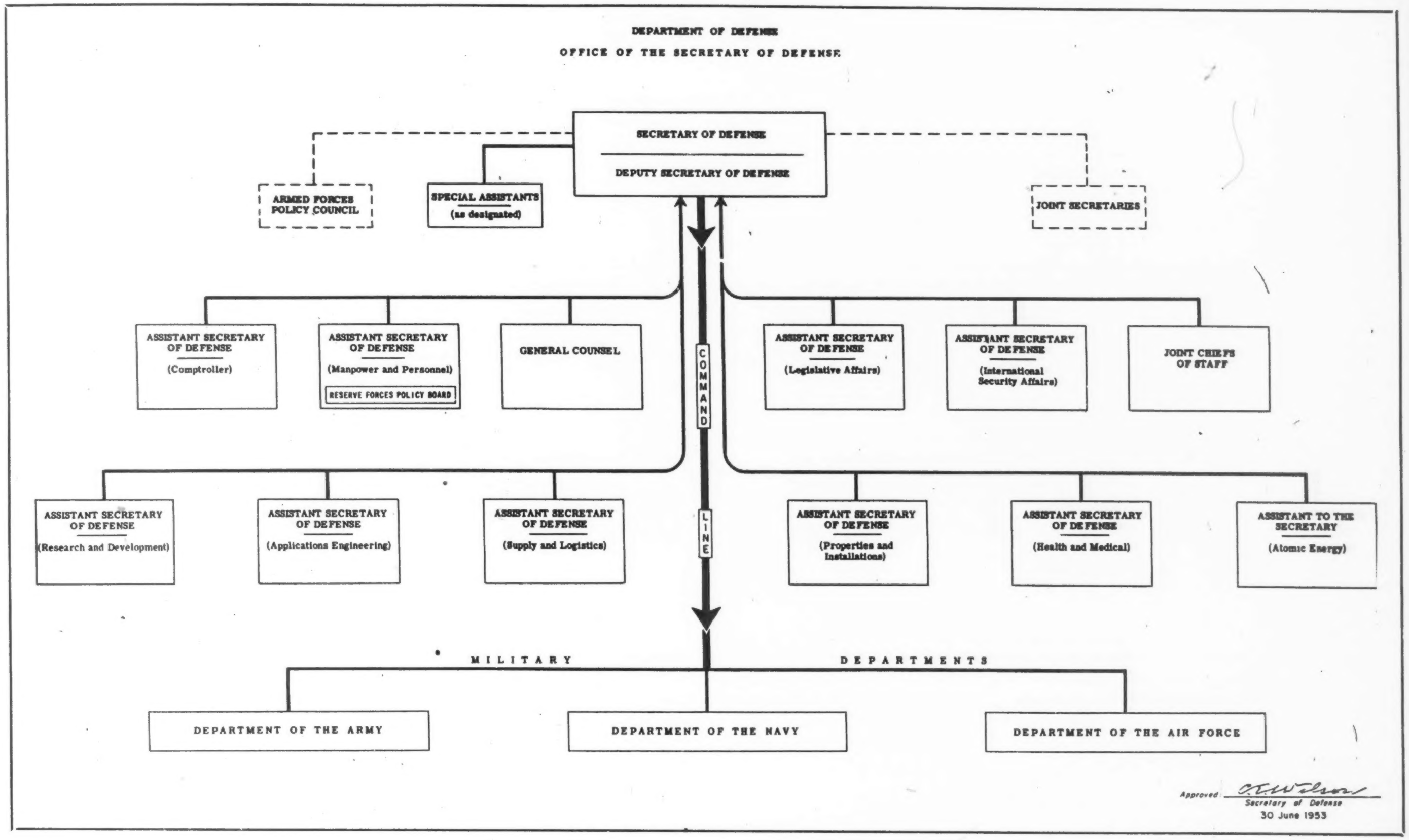
The fifth annual AFCA award to the outstanding cadet of the Signal Corps ROTC Summer Camp at Camp Gordon, Georgia, was won by Cadet Billie E. Davis of the Georgia Institute of Technology.

The award, which consists of the AFCA gold medal and a special certificate, was presented on behalf of the association by Maj. General James D. O'Connell, Deputy Chief Signal Officer, during the final ceremonies of the encampment on July 31.

Maj. Gen. James D. O'Connell, Deputy Chief Signal Officer, awards the AFCA gold medal to Cadet Billie E. Davis as the outstanding cadet at the Signal Corps ROTC Summer Camp at Camp Gordon

Department of Defense Organization Chart

Approved by Secretary Wilson, June 30, 1953


DEPARTMENT OF DEFENSE
OFFICE OF THE SECRETARY OF DEFENSE
SECRETARY OF DEFENSE
DEPUTY SECRETARY OF DEFENSE
ARMED FORCES POLICY COUNCIL
SPECIAL ASSISTANTS (as designated)
JOINT SECRETARIES
ASSISTANT SECRETARY OF DEFENSE (Comptroller)
ASSISTANT SECRETARY OF DEFENSE (Manpower and Personnel)
RESERVE FORCES POLICY BOARD
GENERAL COUNSEL
COMMAND
ASSISTANT SECRETARY OF DEFENSE (Legislative Affairs)
ASSISTANT SECRETARY OF DEFENSE (International Security Affairs)
JOINT CHIEFS OF STAFF
ASSISTANT SECRETARY OF DEFENSE (Research and Development)
ASSISTANT SECRETARY OF DEFENSE (Applications Engineering)
ASSISTANT SECRETARY OF DEFENSE (Supply and Logistics)
LINE
ASSISTANT SECRETARY OF DEFENSE (Properties and Installations)
ASSISTANT SECRETARY OF DEFENSE (Health and Medical)
ASSISTANT TO THE SECRETARY (Atomic Energy)
MILITARY DEPARTMENTS
DEPARTMENT OF THE ARMY
DEPARTMENT OF THE NAVY
DEPARTMENT OF THE AIR FORCE
Approved C. E. Wilson
Secretary of Defense
30 June 1953

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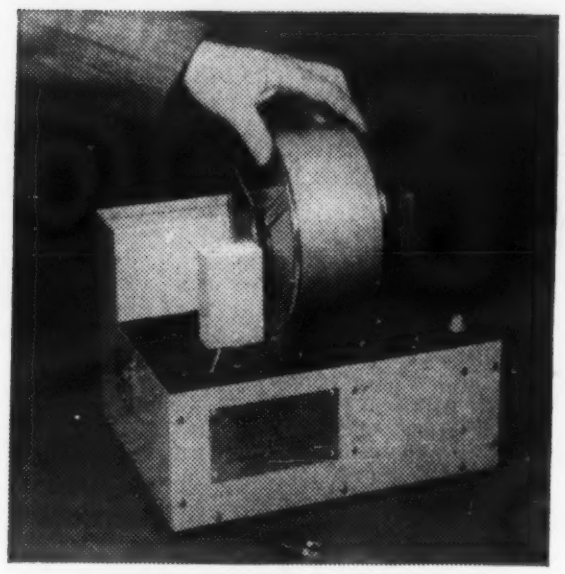

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1953 AFCA-ROTC AWARDS

The AFCA gold medal and special scroll was presented at the close of the 1952-53 academic year to the outstanding senior ROTC (Army, Navy or Air Force) cadet majoring in communications and electronics at each of fifty-six colleges and universities. In several cases, the local chapter of the association donated additional medals for award to outstanding junior and sophomore cadets.

The honor roll of award winners is as follows:

A&M College of Texas
Donald B. Hall

Alabama Polytechnic Institute
Kenneth L. Allums

Carnegie Institute of Technology
John W. Ake
Joseph A. Bercsi
Roger W. Goodel

Clarkson College of Technology
Raymond I. Malthouse

Clemson Agricultural College
Claude S. Simpson

Cornell University
Merton D. Meeker, Jr.

Georgia Institute of Technology
Joel G. King, Jr.

Illinois Institute of Technology
Erwin Pacia

Iowa State College
Daniel C. McEachron

Kansas State College
David C. Ayers

Lehigh University
William T. Spencer

Massachusetts Institute of Technology
Harold T. McAleer
Frederick R. Cronin

Michigan State College
Russell V. Brown

Newark College of Engineering
Edward J. Hoffman

New York University
Albert M. Charmatz
Ulrich E. Dennis
Philip P. Coroso

North Carolina State College
Richard L. Quickel

Norwich University
Alfred S. Gardner

Oklahoma A&M College
Glenn E. Penisten

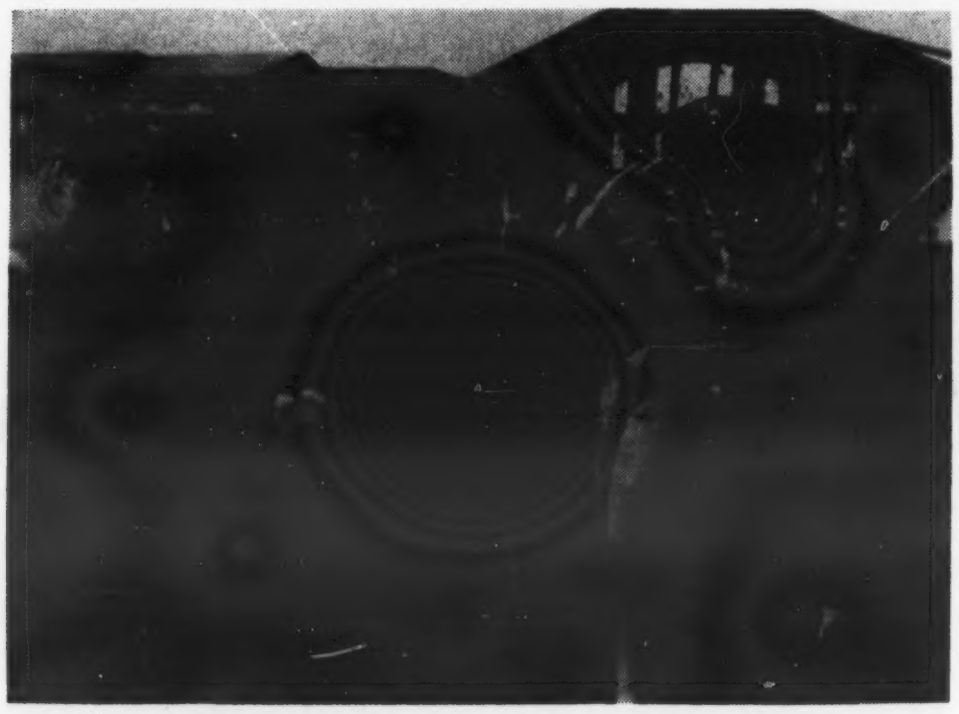
Oregon State College
John A. Young

Pennsylvania State College
John C. Goettel

Purdue University
Donald E. Colvill

Paul F. Hannah, Boston Chapter president, awards AFCA medals at M.I.T. to Harold T. McAleer (center) and Frederick R. Cronin.

Capt. T. C. Thomas, PNS&T, University of Idaho, congratulates AFCA award winner Delbert M. Naser.



Richard A. Munroe, State College of Washington, receives AFCA medal from Col. Moscatelli, PMS&T.

Glenn T. Feilke is awarded the AFCA medal by T. C. Carlson, vice president, University of Arkansas.

Rutgers University
Robert A. Husted

Tennessee Polytechnic Institute
Henry L. Henderson

Texas College of A&I
Milam G. Simons, Jr.
Billy F. Cowart
Valentine G. Mora, Jr.

Texas Technological College
James R. Relyea

Union College
Leonard A. Staskelunas

University of Alabama
George W. Megginson

University of Arkansas
Glenn T. Feilke

University of California
Lawrence H. Wilson

University of Colorado
Robert G. Williams

University of Detroit
Charles R. Rutherford

University of Idaho
Delbert M. Naser

University of Illinois
Thomas E. Beling

University of Kansas
George E. Colander

University of Kentucky
Stanley S. Dickson

University of Louisville
Robert B. Bossung III

University of Maine
Glenn E. Edgerly, Jr.

University of Maryland
Melville E. Eaton, Jr.

University of Michigan
James R. Shaner

University of Nebraska
Curtis E. Sorensen

University of New Mexico
Edward P. Errante

University of Notre Dame
Robert F. Finney
Edward R. Byrne

University of Oklahoma
Ernest P. Moore, Jr.

University of Pennsylvania
Yale J. Lubkin

University of Tennessee
Ray H. Farmer

University of Texas
Donald P. Harris

University of Washington
Alvin P. Hjorten

University of Wisconsin
Thomas T. Thwaites

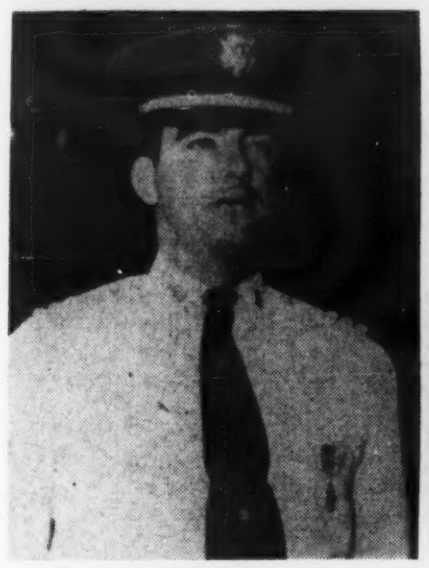
Utah State Agricultural College
Thurman W. Gardner

Villanova College
Donald E. Lander

Charles W. Swickert
West Virginia University

Donald P. Harris
University of Texas

Stanley S. Dickson
University of Kentucky



Claude S. Simpson
Clemson Agricultural College

Leonard A. Staskelunas
Union College

Lawrence H. Wilson
University of California

Doyle C. Counts, Virginia Polytechnic Institute, is awarded the medal by Maj. Gen. Devine, commandant of cadets.

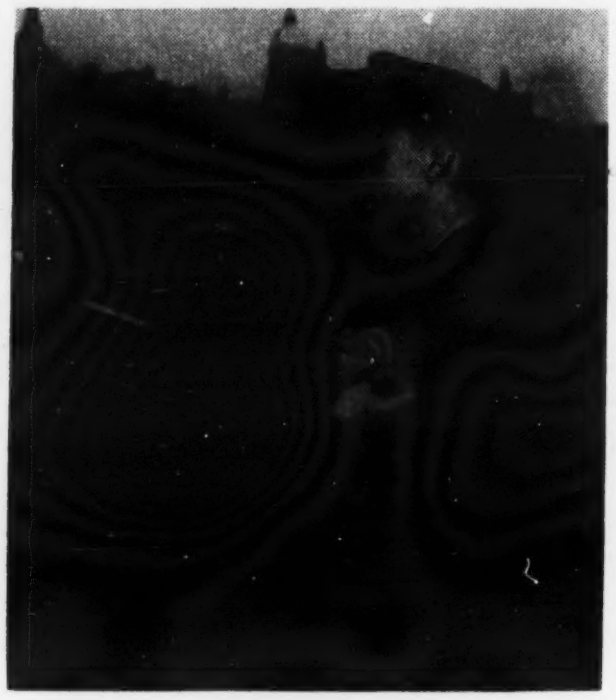
Col. Laurence C. Brown, PMS&T at Kansas State College, congratulates AFCA award winner David C. Ayers.

Ralph W. Will, Pittsburgh Chapter president, congratulates John W. Ake, award winner at Carnegie Tech.

William T. Spencer, Lehigh University, is awarded the AFCA medal by Lt. Col. Ralph A. Newman, PAST.

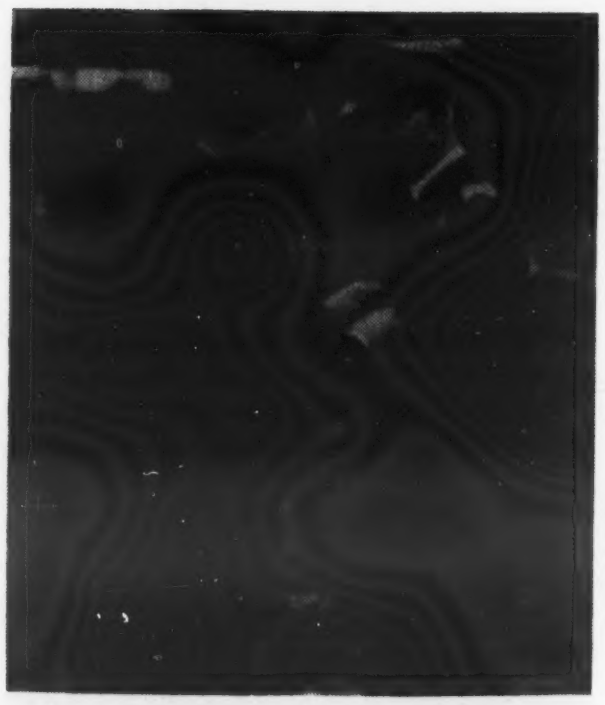
Prof. Paul C. Cromwell, University of Tennessee, presents the AFCA award to Ray H. Farmer.

Col. John L. Parker, PAST, looks on while Dean Harold O. Ried, University of Mexico, makes award to Edward P. Errante.

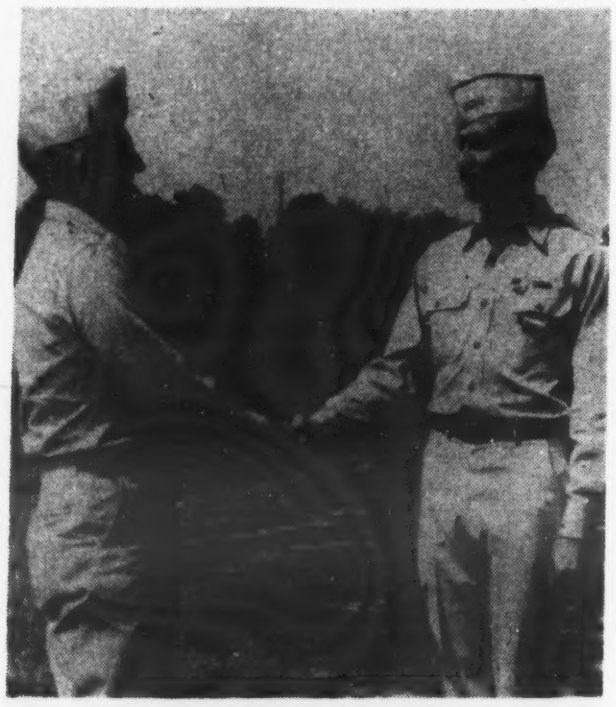


Col. Melie J. Coutlee, PAST, University of Notre Dame, awards medal to Edward R. Byrne.

Edward J. Hoffman, Newark College of Engineering, is congratulated by Lt. Col. David B. Tudor, PAST.



Dr. R. C. Ernst, Dean, Speed Scientific School, University of Louisville, presents medal to Robert B. Bossung III.



Lt. Col. S. A. Stricklen, Asst. PMS&T, Alabama Polytechnic Institute, congratulates award winner Kenneth L. Allums.

Donald F. McClure, New York Chapter president, awards AFCA gold medal to Albert W. Charmatz, New York University.

Virginia Polytechnic Institute
Doyle C. Counts

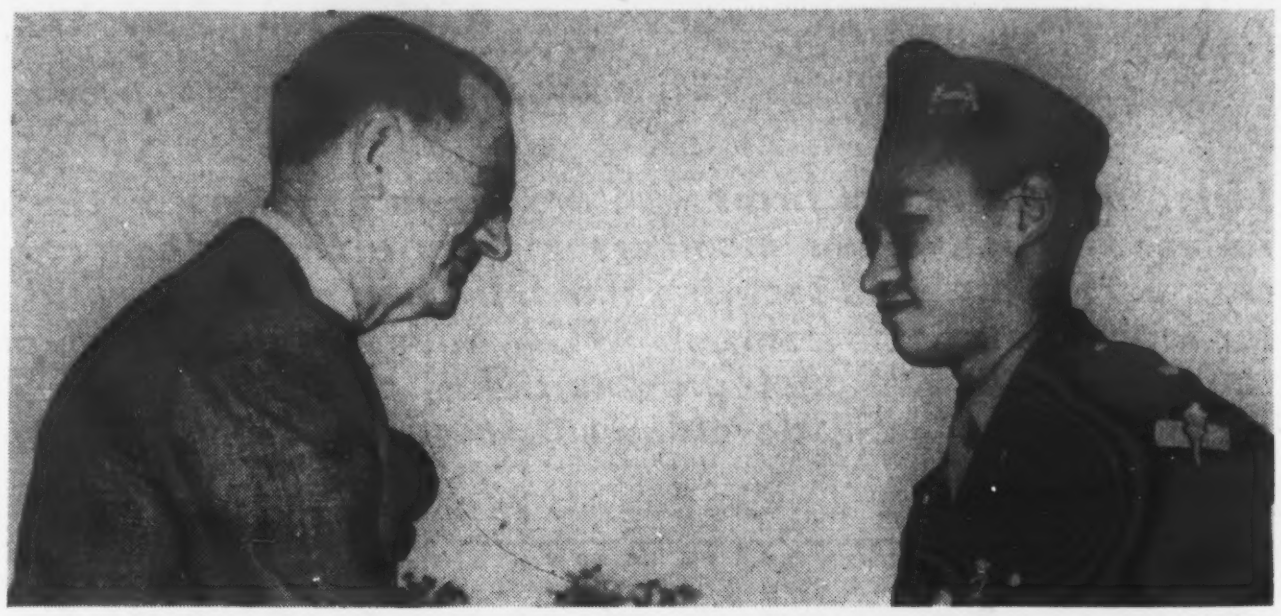
Washington State College
Richard A. Munroe

West Virginia University
Charles W. Swickert

Worcester Polytechnic Institute
Richard C. Kee

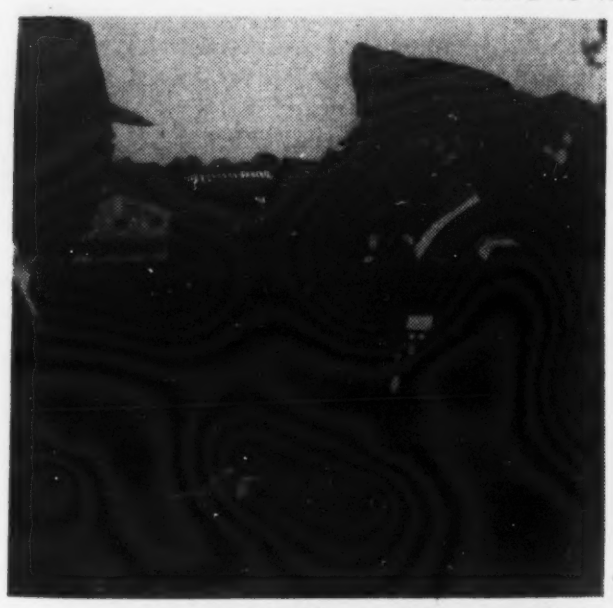
The following colleges had not yet reported the names of the award winners as SIGNAL went to press:

Northeastern University, Rensselaer Polytechnic Institute.

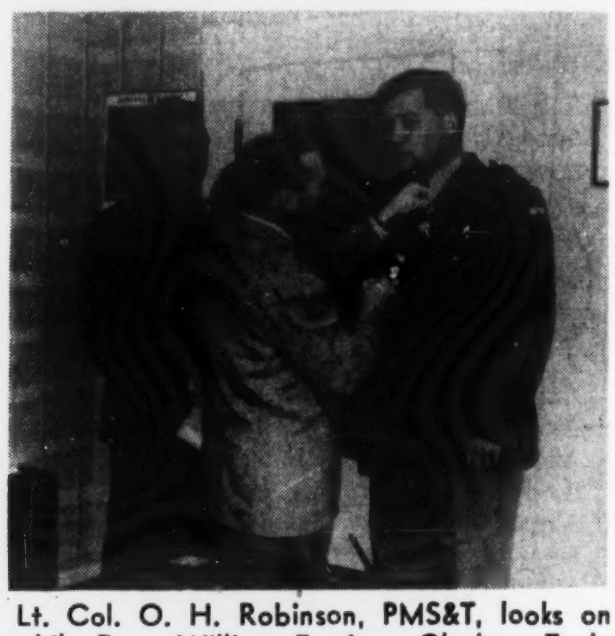


Acting President Dean Frank W. Roys, Worcester Polytechnic Institute, presents AFCA award to Richard C. Kee.

Richard L. Quickel, North Carolina State College of A&E, is congratulated by Col. Richard R. Middlebrooks, PMS&T.



Dr. A. L. Strand, President of Oregon State College, presents AFCA medal to John A. Young.



Lt. Col. O. H. Robinson, PMS&T, looks on while Dean William Farrisee, Clarkson Tech, awards medal to Raymond I. Malthouse, Jr.

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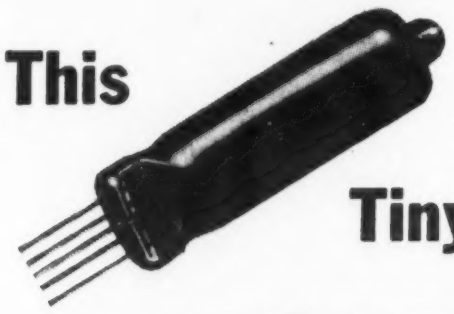

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Dukane Corporation
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Eastern Air Devices, Inc.
Eastman Kodak Company
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General Cable Corporation
General Communications Co.
General Electric Company
General Insulated Wire Works, Inc.
General Telephone Corp.
General Transformer Co.
Gilfillan Bros., Inc.
Globe Wireless, Ltd.
Graflex, Inc.
Gray Manufacturing Co.
Guardian Electric Mfg. Co.
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Hammarlund Manufacturing Co., The
Hazeltine Electronics Corp.
Heinemann Electric Company
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Triad Transformer Corp.
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Wells Sales, Inc.
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Whitney Blake Co.
Wickes Engineering & Construction Co.
Willard Storage Battery Company
Wisconsin Telephone Company
Wollensak Optical Company
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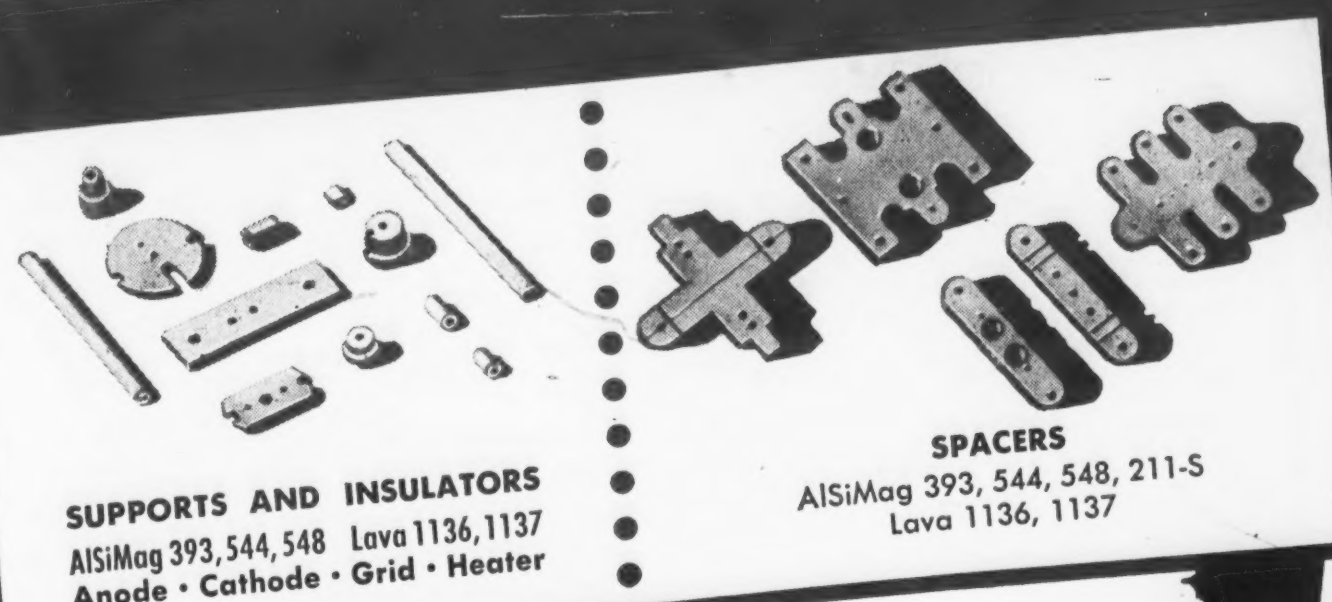

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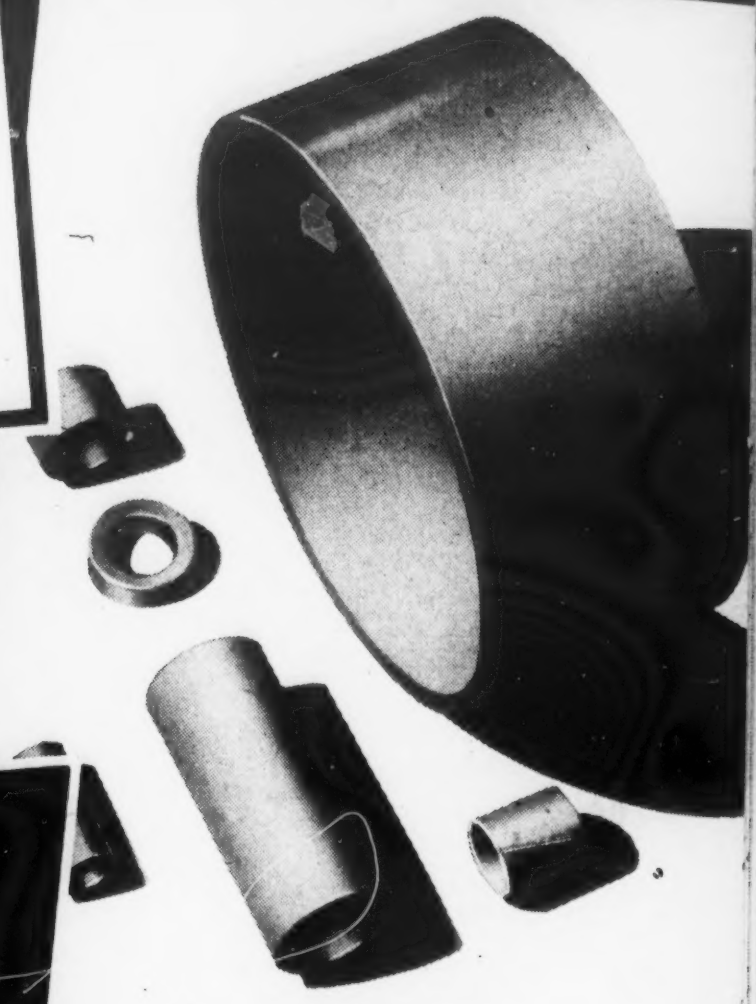
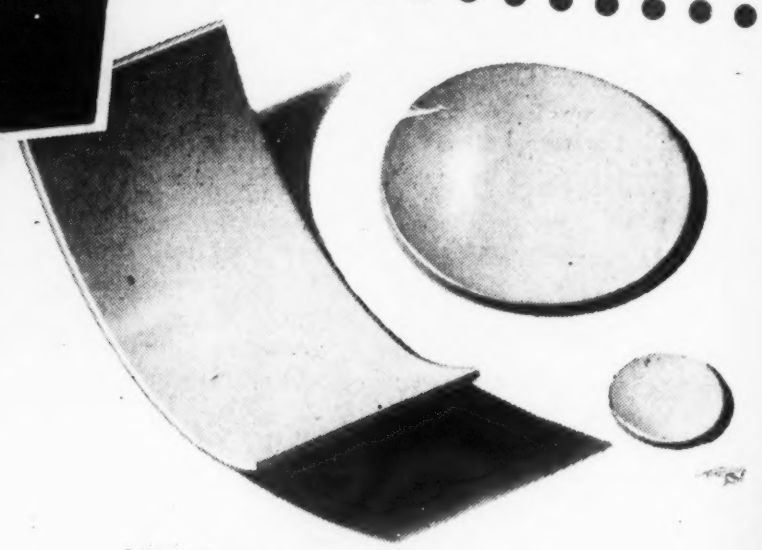
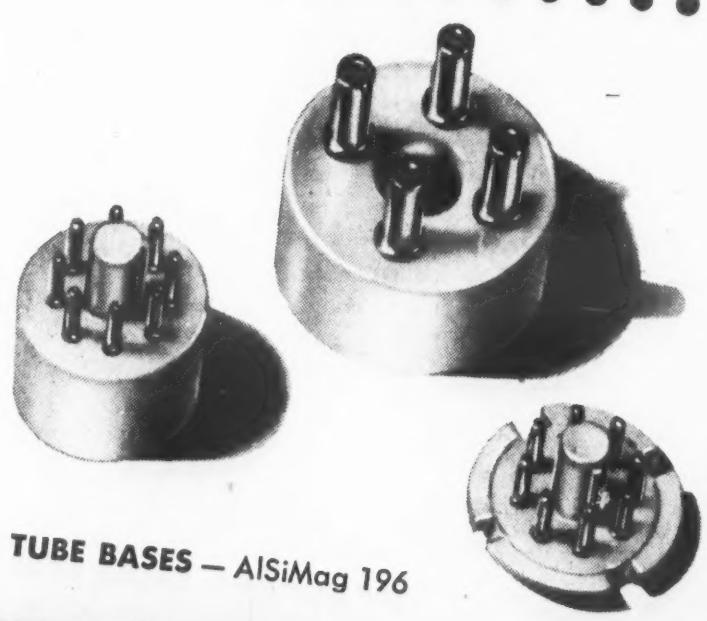


ENVELOPES
Precision ground internally and externally
AlSiMag 576, 243



WINDOWS — Precision Ground
AlSiMag 576, 243



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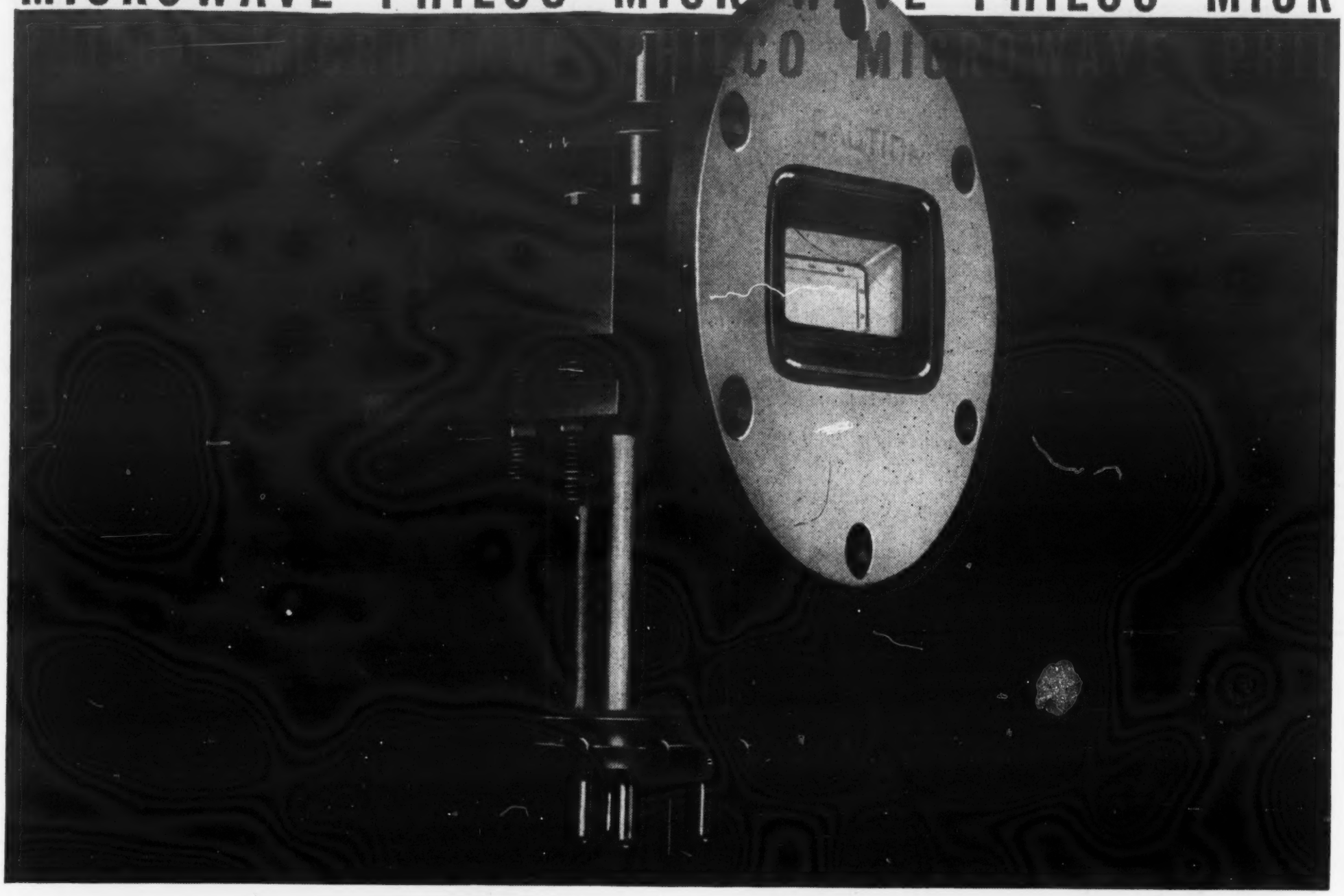

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Chapter News

1953 Chapter of the Year—Augusta-Camp Gordon

Augusta-Camp Gordon

An evening of entertainment, under the joint sponsorship of the Southern Bell Telephone and Telegraph Co. and Radio Station WRDW, featured the chapter's June 24th get-together.

Following an excellent barbecued chicken dinner, John Owen of Southern Bell, chapter vice president, showed a film of the Georgia-Vanderbilt football game. WRDW entertainers, "Peanuts" Faircloth and Boots Skinner, then presented a fine program of songs and patter. The chapter reports the endurance of the entertainers could not equal the enthusiasm of the members.

It was announced that the next meeting would be under the sponsorship of the Georgia Power Company.

Baltimore

A visit to the United States Naval Radio Station at Annapolis on June 20th proved a fitting climax to the many fine activities scheduled by the Baltimore Chapter during the 1952-53 season.

Arriving at the Station at 11 A.M., the seventy-six members and guests were welcomed by Captain H. R. Demarest, commanding officer, who also described his duties and the Naval organization relating to radio communication. The use of the transmitting equipment at the Station was explained by Mr. Goodhue, staff engineer. Navy enlisted men who had volunteered to act as guides were then introduced, and members were divided into small groups and escorted through both transmitter buildings, using a Navy bus for shuttle service between the buildings.

At the conclusion of the tour, the members adjourned to the Officers' Club at the Naval Academy for luncheon. Following luncheon, some members visited the Sonar Barge, a few toured the Naval Academy, but the majority boarded a Navy YP boat for a cruise around Annapolis Harbor, returning at 4 P.M.

Chapter members were unanimous in their appreciation of the excellent program arranged by Captain Demarest and members of his staff.

Annual elections were held recently, with the following officers re-elected for another year: president—George C. Ruehl; vice-presidents — Capt. H. R. Demarest, and Donald C. Lee, Westinghouse Electric; secretary — Plummer Wiley, Chesapeake & Potomac Telephone Co.; recording secretary—Mrs. John A. Shipley; treasurer—Albert Busch, Bendix Radio. New members on the chapter slate are the following vice-presidents—Gen. Leyton I. Davis, Air Research Development Command, and Capt. E. E. Comstock, United States Coast Guard.

Chicago

The American Phenolic Corporation, AFCA group member, was host to the chapter for its June 24th dinner-meeting.

After welcoming the chapter members and guests, Arthur J. Schmitt, president of American Phenolic Corporation, spoke of his company's strong belief in preparedness. To that end, he said, Amphenol maintains a strong engineering and production team at hand ready for any eventuality. He pledged its continued support of the government and its armed forces and stated it is his intent and desire to cooperate with all governmental agencies so long as there is the slightest danger to the American way of life. In this regard, Mr. Schmitt outlined some of the many dangers facing this country both from within and from without its borders.

Amphenol's growth was described by William H. Rous, vice-president and director. He covered the progress of the company from its first product—a molded socket—to the 9,000 or more electric-electronic components it now manufactures. He pointed out that, from humble beginnings twenty years ago, the company has grown to where it now has over 2.200 employees in five plants. The first shovelful of earth was just turned for a new plant, the sixth, which will be a valued addition to the production of military antennas, high frequency connectors and related items.

Following the talks, the group examined various exhibits of Amphenol's new products and processes.

The meeting, which was attended by 200 members and guests, was presided over by the chapter's new president, William C. DeVry. The other new officers are: vice-presidents — Carrington Stone, consulting engineer; Fritz Franke, Hallicrafters Company; Raymond K. Fried, attorney; C. G. Duncan-Clark, Walker-Clark Associates; secretary-treasurer — Henry J. McDonald, Kellogg Switchboard & Supply Co. Directors are: Oliver Read, Ziff-Davis Publishing Co.; John Howland, Stewart-Warner Electric; James H. Kellogg, Kellogg Switchboard & Supply Co.; D. B. Miller, Coyne Electrical School; Raymond A. Johnson, American Telephone and Telegraph Co.; E. E. Mead, Kleinschmidt Laboratories; Frank Meade, Automatic Electric Co.; O. G. Smith, Illinois Bell Telephone Co.; Samuel R. Todd, consulting electrical engineer.

Dayton-Wright

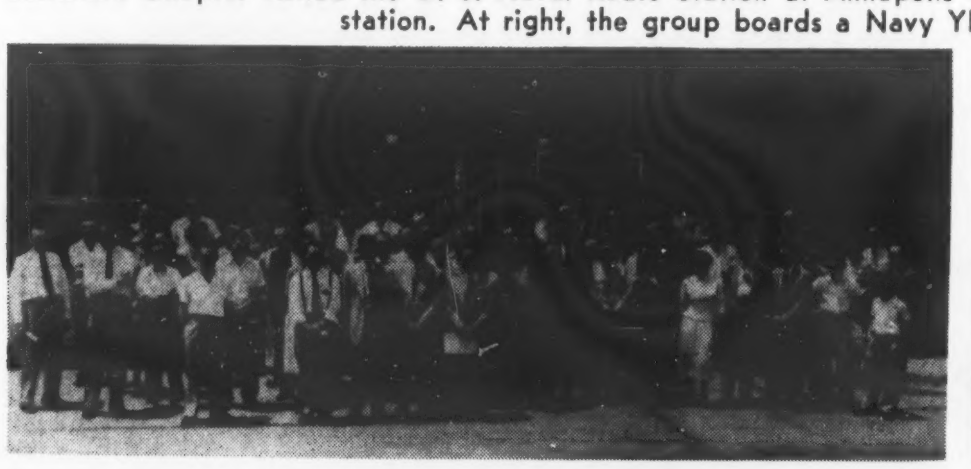
George B. Meyer and George A. Gardner of Westinghouse Electric Corp. were elected president and secretary, respectively, at the chapter's annual elections on June 24th. (Names of the other officers and report of the meeting had not been received as SIGNAL went to press.)

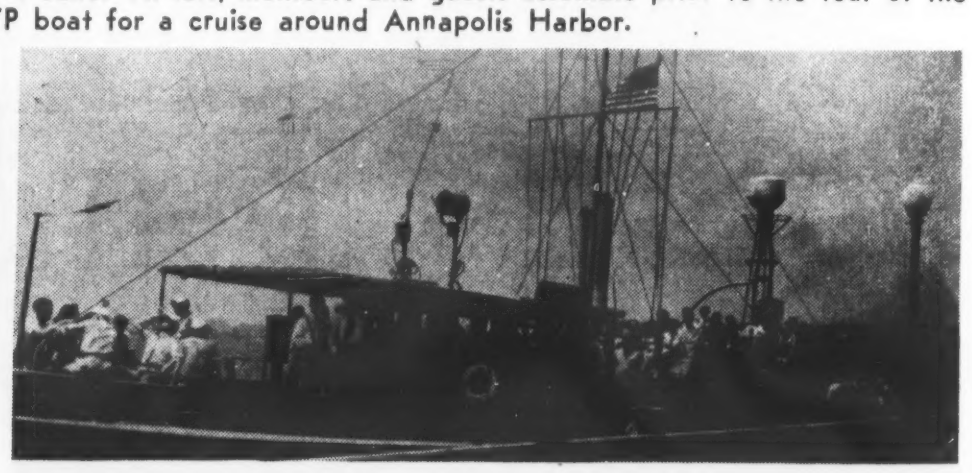
Decatur

A visit to the Illinois Power Company microwave station was the highlight of the chapter's June 24th meeting. Members and guests first were briefed on the operation and various uses of the microwave equipment by Mr. J. R. Castle and his associates, and then were conducted on a comprehensive tour of the installation.

A business meeting was held in the Officers' Mess of the Decatur Signal Depot prior to the trip to the Power Company. President William Thomson reported on the national convention which he and other chapter delegates had attended in Dayton. A committee composed of Elmer Cupp, Henry Hines and Mons Monson was appointed to contact the Scott-St. Louis and Chicago Chapters regarding a joint meeting.

Baltimore Chapter visited the U. S. Naval Radio Station at Annapolis in June. At left, members and guests assemble prior to the tour of the station. At right, the group boards a Navy YP boat for a cruise around Annapolis Harbor.





Plans were also discussed for a chapter picnic later in the summer. Herman Tille was appointed a member of the Board of Directors.

Fort Monmouth

The chapter concluded its 1952-53 season, which was exceptional for its interesting and well attended meetings, with a dinner-dance on June 26th.

The social event, which is becoming a traditional occasion, was held at Gibbs Hall. Those attending included members of the Fort Monmouth command, civilian chapter members, wives and other guests of the different groups. Music was provided by the First Air Force Band, one of the outstanding groups of its type.

Electronic Associates, Inc., of Long Branch, which holds a group membership in the chapter, chose the time for an annual social gathering.

Membership in the chapter has grown to more than 500 during the past year under the presidency of Col. Joseph E. Heinrich, who is deputy president of the Signal Corps Board, and the chapter now ranks as the second largest unit in the AFCA. The active support of Maj. Gen. K. B. Lawton, Commanding General of Fort Monmouth and the Signal Corps Center, has been of great value to the chapter in carrying out its objectives.

New York

Members of the New York Chapter, their ladies and guests, attended a picnic at Governors Island on June 24th and enjoyed good food, good fellowship, and, last but not least, good weather.

The group was met at Governors Island by busses and transported to the picnic grounds at the south end of the Island where two outdoor fireplaces were in full operation. Music for dancing was furnished by an orchestra composed of members of the First Army Band.

Lt. Col. K. I. Davis, who in the absence of Col. Frank Kidwell (First Army Signal Officer and Vice President of the New York Chapter) acted as host, welcomed the members and their guests on behalf of the First Army. Chapter President Don McClure thanked Col. Davis and his staff for their efforts in making the picnic such a success and also requested Col. Davis to express to General Burress and Colonel Blakeney the sincere appreciation of the chapter for their courtesy in making the picnic possible.

Paris

Not to be outdone by Francis the First, and Napoleon, the Paris Chapter held its July 10th meeting at Fontainbleau, famous for centuries as the site of rambling royal chateaux and the summer spot of kings, but now noted as the military hub of Allied Land, Air and Sea Headquarters of Central Europe.

PUTTING MANY VOICES
ON ONE TRANSMITTER
A basic part of microwave radio links is carrier equipment to put the desired number of voice channels into one wide frequency band for transmission between distant points. But many of the early installations of microwave systems depended on "custom-built" carrier equipment — often an expensive modification of telephone carrier equipment designed for wire-line transmission.
For nearly a decade Lenkurt has been filling a practical need in multi-channel radio systems by providing carrier equipment specifically for radio and designed for quantity manufacture. Using frequency division methods to assure maximum system versatility, Lenkurt radio carrier systems multiplex from 4 to 72 voice channels for transmission over any suitable radio equipment. Each carrier-derived channel is "toll quality" — it can be used by telephone companies connected to the nationwide toll network as well as in the private systems of railroads, pipe lines, electric utilities and government agencies.
Radio channelizing equipment by Lenkurt, leading independent manufacturer of telephone carrier systems, is used with VHF and microwave equipment of most major radio manufacturers in both common carrier and private communications installations throughout the world.
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SAN CARLOS 1, CALIFORNIA

Chicago Chapter. At left is shown May meeting at Stewart-Warner Electric. June meeting was held at the American Phenolic Corporation. Below, left, is general view of demonstration which followed the meeting at Amphenol; at right, at speakers' table are (l to r): Cdr. R. C. Sergeant; Chapter President William DeVry; Arthur J. Schmitt, President, Amphenol; W. H. Rous; Fritz Franke; and Carrington H. Stone.

Two bus loads from SHAPE made the forty-mile trip to be guests of the Fontainbleau detachment of the Paris Chapter. Before the gay party-banquet-business meeting at the Inter Allied Officers' Club, a number of members and guests took advantage of the occasion and visited the crumbling chateau.

Sheer fun was the keynote — fun sprinkled with sagacity by the speaker of the evening, Brig. Gen. Ivan Farman, Assistant Chief of Staff, Communications, Allied Air Forces Central Europe.

General Farman's speech was aimed at the communications industry. He stressed that all that the military required from industry was the impossible. He wondered when industrial mass production would reduce unit costs so much that the military would be able to afford units *and* spare parts. He longed for that future day when communications equipment would be half as cheap and twice as durable, and wistfully hoped for equipment that would be easy to maintain. He ended by challenging industry to state its requirements as frankly. Among the members of industry present were Mr. A. H. de Goede of International General Electric Company, Mr. A. de Bondini of International Automatic Electric Corporation, and Mr. M. Berzin, engaged in materiel and construction.

Colonel Raymond Strasburger, Communications Plans & Training, Allied Air Forces Central Europe, was the master of ceremonies. After being introduced by the presiding officer, Col. G. H. Palmer of the European Military Communications Coordination Committee, Colonel Strasburger started the evening off with a bang by shooting a dish-dropping waiter in an hilarious attempt to acquire tranquility. Two very naked chickens dropped from the rafters to the banquet table by two well-placed shots of the nonchalant master of ceremonies, also added meat to the program.

Major General F. L. Ankenbrandt, Chief Signal Officer of SHAPE and Vice President of the Paris Chapter, summed up the evening by saying: "It was fun, and when you can mix fun with a few good points, a little common sense here and there, you have a good meeting."

Pittsburgh

Colonel Alvin L. Pachynski, Deputy Director of Communications, USAF, was guest speaker at the chapter's annual banquet on June 18th. With "Management of Air Force Communications Around the World" as his topic, Col. Pachynski gave his audience an excellent appreciation of Air Force communications operations, problems and developments, both in equipment and manpower.

Former National AFCA President W. W. Watts was also a guest of the chapter. His brief remarks concerning the meaning and scope of the AFCA left little doubt in anyone's mind of the significance and necessity for such an organization.

A social hour preceding the banquet at the Wiliam Penn Hotel gave the 145 members and guests an opportunity to become better acquainted. The atmosphere was further enhanced with music provided by a string quartet. The banquet, which got under way with the playing of the Star Spangled Banner and appropriate invocation, was smoothly emceed by Ralph Will, outgoing Chapter President.

An excellent rendition of many favorite songs by the Westinghouse Quartet provided an appropriate ending for a most enjoyable and successful evening.

San Francisco

Members and guests of the San Francisco Chapter met on July 24th for an inspection of the facilities of the Naval Air Station at Moffett Field, Mountain View, California, and the installation of the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics at the same location. Dinner preceding the inspection tour was held at Rickey's Studio Inn Restaurant at Palo Alto.

Hosts of the evening for the Ames Laboratory were Mr. Wentz, Public Relations Director, and Mr. Quigley of the administrative staff. Lt. Cmdr. H. J. Kazcmarick, Communications and

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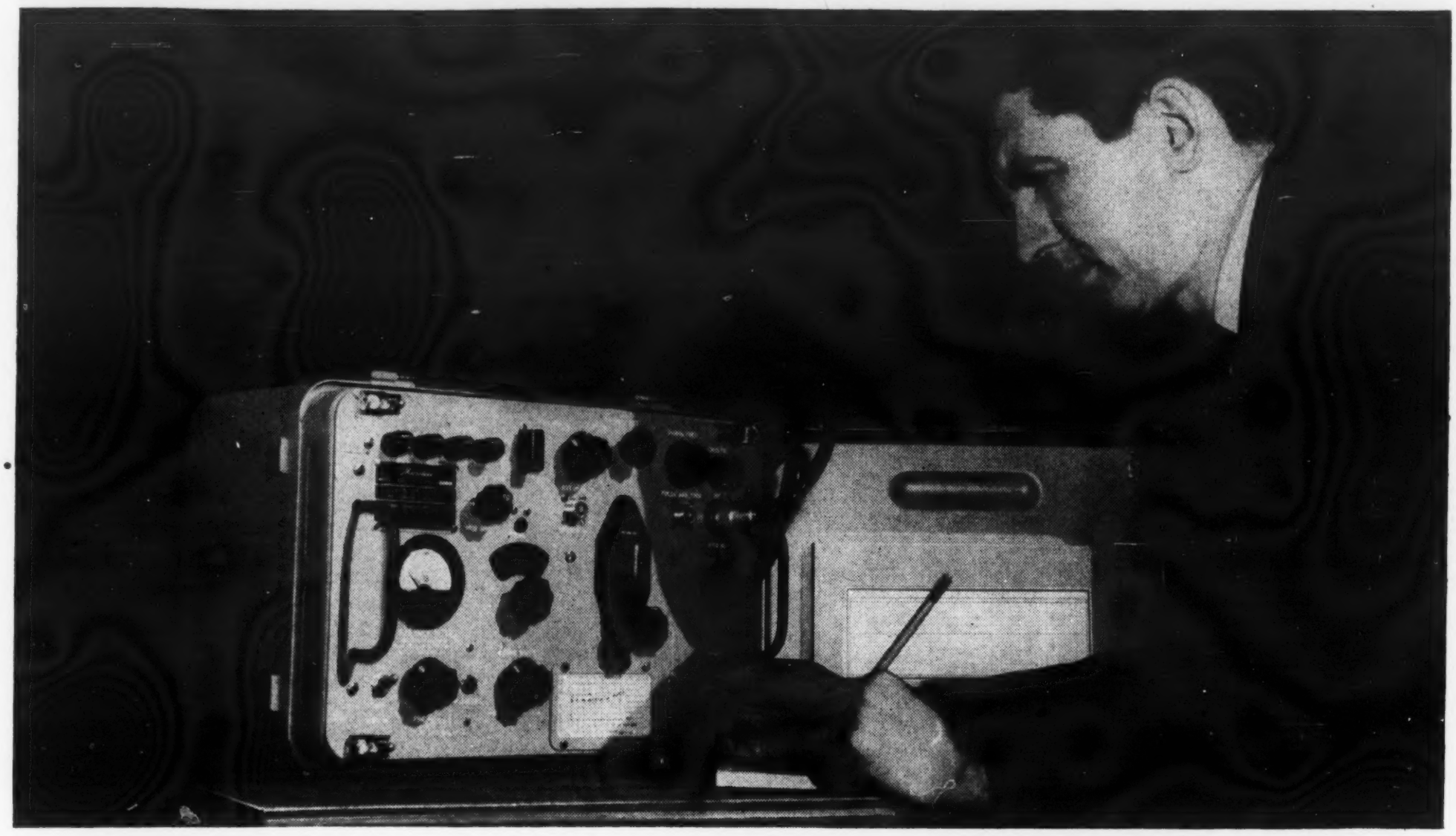
WITH MICROLINE* TEST SET AND RANGE CALIBRATOR

Included in Sperry's complete line of Microline instruments are the 38A Test Set (TS 147B/UP) and the AN/UPM-11 Range Calibrator for the accurate testing of X-band radars. These equipments, of rugged design for field usage, can also be employed in laboratory and production testing.



MODEL 38A Test Set (TS 147B/UP)

This portable test set is suitable for measurements on all radar, beacon or missile systems in the 8500-9600 mc. range. It supplies microwave signals of known frequency and power, either continuous wave, frequency modulated or externally modulated. It also measures the power and frequency of external signals in the above frequency range. Model 38A contains a direct reading frequency meter, wattmeter and signal generator which allow the measurement of power and frequency of radar transmitters as well as receiver sensitivity, bandwidth, recovery time and AFC action. Tuning of the frequency meter is accomplished with both a direct and a 5 to 1 reduced drive mechanism for ease of determining narrow pulsed signals as short as 0.2 microseconds.

SPECIFICATIONS:

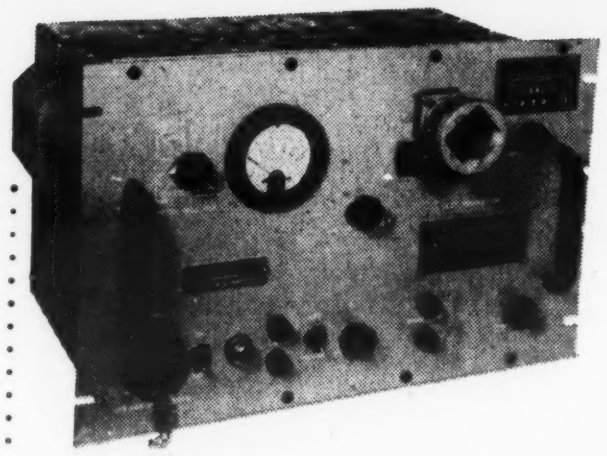
R-F Power Output: Adjustable from −7 to −85 dbm (decibels relative to one milliwatt).

R-F Power Input: From +7 to +30 dbm.

Accuracy: ±1.5db. A calibration chart is supplied.

Frequency Meter Accuracy: ±2.5 mc. absolute at 25°C and 60% RH. Calibration point 9310 ± 1.0 mc.

Our nearest district office will be happy to supply further information on these and other Microline instruments.



MODEL AN/UPM-11 RANGE CALIBRATOR

This instrument is used to test X-band fire-control radars which operate in the 8500-9600 mc. frequency band. It receives microwave signals from a radar and responds with accurately spaced pulses thereby providing a means of calibrating the radar range. It can also be used to boresight the antenna axis of any X-band radar system.

SPECIFICATIONS:

Range Markers: 200 to 50,000 yds. depending on delay line

Accuracy: ± 5 yards

Repeatability of readings (same radar system): ± 1 yard

Tuning: Manual or AFC

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CHAPTER NEWS

Electronics Officer, and Chief Warrant Officer Anthony of the Public Relations Office represented the Naval Air Station.

Highlight of the evening was the inspection of the Ames wind tunnel, believed to be the largest in the world and suitable for testing full scale models of fighter aircraft. The tunnel is powered by six 6.000 horsepower electric motors and produces velocities up to 250 miles per hour in the 40x80 throat. Complete instrumentation is provided for measuring lift characteristics of the complete air structures as well as local pressures

New York Chapter's annual social gathering was held at Governors Island on June 24th. A picnic followed by dancing provided the highlights of a very pleasant occasion.

Scott-St. Louis Chapter members shed their coats and took over operation of the St. Louis Civil Defense Control Center recently. Standing next to the table-top map on which "raid movements" were plotted are (l to r); Capt. Robert L. Oase, Harold F. Smiley, Col. Malcolm Elliott of the center, Dale Burgess and Lt. Laurie T. Niemi (USN).

at small individual areas. Mr. Wentz explained the mission and history of the Ames Laboratory and discussed the technical operation of the testing facilities.

At the adjoining Naval Air Station the group inspected various types of modern Naval fighter planes now housed in the hangars originally constructed for Naval airships.

The chapter has grown steadily in strength and activity under the leadership of President Lloyd C. Parsons and now has the largest and most interested membership in its five-year history.

San Luis Obispo

Third-dimension photography is the first major advance in the motion picture industry since "talkies" were developed in 1926, said Lt. Col. Jack Warner, Jr., executive producer at Warner Bros. Studio, before the July 20th meeting of the San Luis Obispo Chapter.

In his lecture, Lt. Col. Warner first gave the history of 3-D photography, showing it was originally advanced as a theory by Euclid in 300 B.C. He described 3-D adaptations to military, scientific and amateur use, with special reference to its use in motion pictures, and explained the different systems now employed—such as Warnerscope, Cinerama, and Cinescope—and the 3-D of the future, now used by the military with the vectograph.

The talk was illustrated with 3-D color slides, most of which were taken by the speaker while on a recent two-weeks' tour of duty at Camp San Luis Obispo, plus some taken at Warner Bros. Studio in Hollywood. Lt. Col. Warner also introduced to the audience a new improved type of polaroid glasses for viewing 3-D pictures.

The meeting, which was preceded by dinner at the Officers' Club of Camp San Luis Obispo, drew an attendance of ninety-six members and guests.

Scott-St. Louis

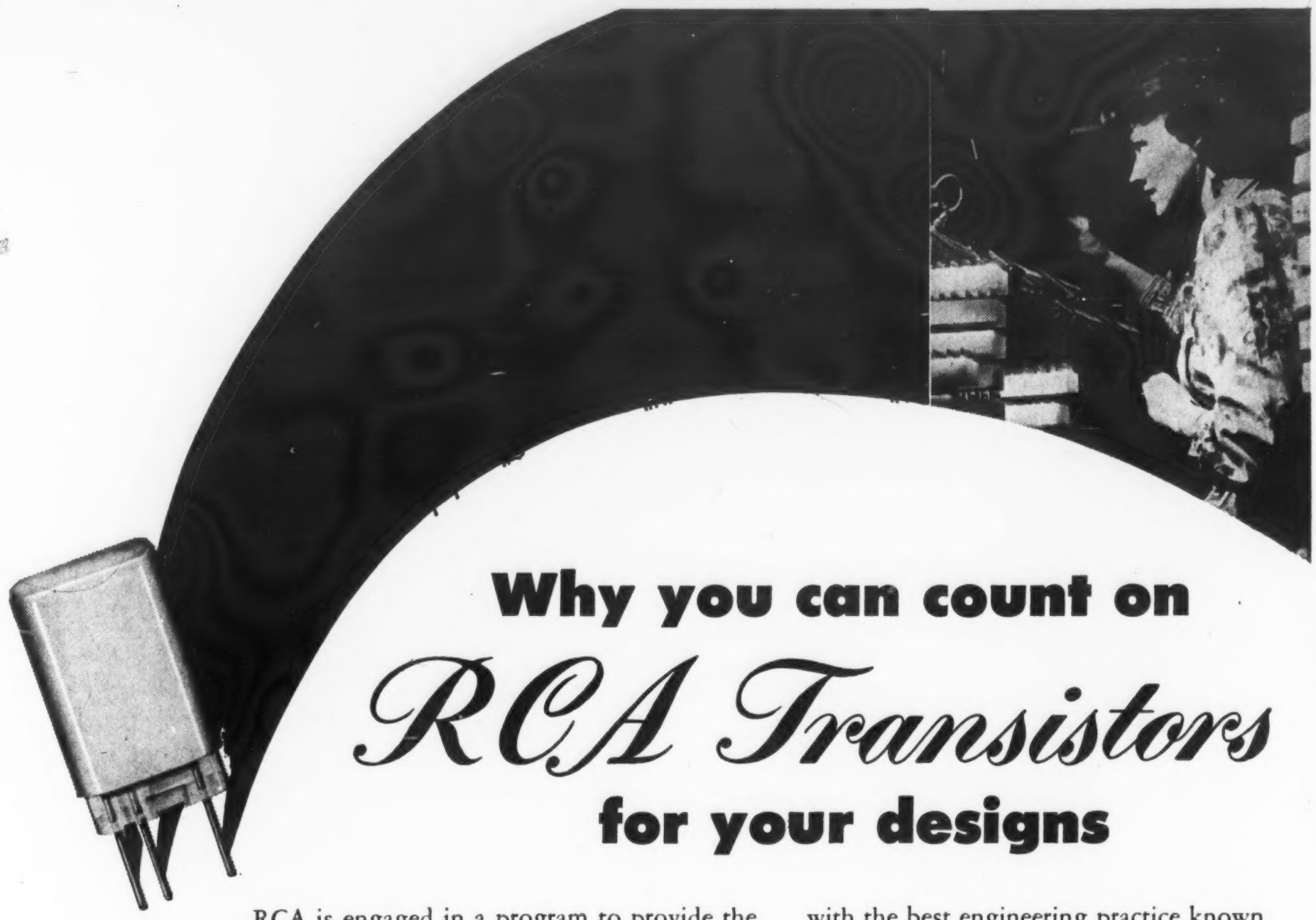
A most unusual and interesting evening was spent by members of the Scott-St. Louis Chapter on May 8th. Instead of the usual type meeting, the chapter visited the St. Louis Civil Defense Control Center for the purpose of familiarizing its members with the workings of a Control Center and, particularly, its communications aspects.

Much to the surprise of the members, a mock raid was staged and they found themselves performing the duties involved in the operation of the Civil Defense Control Center. Members acted as controller, monitor, message handler, plotter, etc., and the 45-minute practice raid gave conclusive proof of the center's efficiency. Activity was recorded on the "Status Board" and "raid movements" were plotted on the huge 30-foot tabletop map of the St. Louis area.

Other members served as monitors for the Red Cross, public utilities, etc., in the balcony surrounding the plotting map, and "sent" appropriate messages to their respective organizations as status of the "raid" changed from time to time.

The visit was arranged by General Francis P. Hardaway, Acting Director of the St. Louis Office of Civil Defense, who was assisted by Col. Malcolm El-

San Luis Obispo Chapter. Below, Lt. Col. Jack Warner, Jr., of Warner Bros. Studio, guest speaker, explains the 3-D slide projector to (l to r): Lt. Col. Mansell A. Walker, Col. Merle C. Bowsky, Col. R. P. Lyman, Guinard H. Rydell and William H. Angel.



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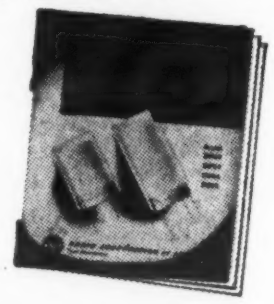

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	Collector Dissipation (mw)	Ambient Temperature (°C)	Power Gain (db)	Frequency for Alpha Cutoff (Mc)	Approx. Useful Power Output at 50 Mc (mw)	Current Amp. Factor (approx.)
RCA-2N32 Point-contact type—for pulse or switching applications	50	40	21*	2.7#	—	2.2†
RCA-2N33 Point-contact type—for escillator applications up to 50 Mc	30	40	—	—	1.0	—
RCA-2N34 Junction p-n-p type—for low power, af amplifier applications	50	50	40**	—	—	40††
RCA-2N35 Junction n-p-n type—for low power, af amplifier applications	50	50	40**	—	—	40††

* With collector load resistance of 10000 ohms, signal-source impedance of 500 ohms, and signal frequency of 5000 cps.

†† Between Base Connection and Collector.

Measured at a point 3db down from its low-frequency value (100KC). Cutoff frequency is defined as the frequency at which the current amplification factor has dropped to 0.7 of its low-frequency value.

** With collector load-resistance of 30000 ohms, signal-source impedance of 500 ohms, and signal frequency of 5000 cps.

† Between Emitter and Collector.

RADIO CORPORATION of AMERICA
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liott, Jack Dierkes, and Harry Links. General Hardaway and Mr. Links are both active members of the Scott - St. Louis Chapter.

The chapter provided its members and guests with another unique and interesting meeting on June 11th when it featured a talk on "Subversive Activity" by Lt. Joseph L. Gallagher of the St. Louis Police Academy. The speaker was introduced by Clifford Wassall of the Southwestern Bell Telephone and Telegraph Co., a director of the chapter, whose promises of a very interesting lecture were more than fulfilled.

As Director of the St. Louis Police Academy, Lt. Gallagher has been associated with police work for the past eighteen years, and is largely responsible for the training course currently conducted at the Academy, which is considered to be one of the best in the country. He very dramatically outlined the methods and techniques used by subversive groups and told how the Academy course has been designed to teach police officers everything there is to know about investigating and combating such groups. He described the function of municipal law enforcement agencies and their relationship to the Federal Bureau of Investigation, and explained how both Federal and municipal agencies are carrying out their programs of uncovering groups which advocate the overthrow of the United States government.

Guests of the chapter for the buffet supper-meeting at the Belleville Elks' Club included representatives of the Belleville Police Department, St. Clair County Sheriff's Office, Scott Air Force Base Provost Marshal, the Base OSI Office, and Headquarters, Air Training Command.

Washington

The chapter's working organization for 1953-54 has been completed with the appointment of the following committee chairmen: membership — Cdr. Leslie B. Tollaksen of the Philco Corporation; program—John H. Gilbarte, Admiral Corporation.

Chapter President Thomas B. Jacocks and his staff are now making plans for a series of programs which will uphold the Washington Chapter's reputation for outstanding meetings.

Iowa State College Chapter. Col. Robert Conrath, president of the Kansas City Chapter, formally presents the new student chapter charter to James D. Conlan, chapter president, while Maj. William L. Holcomb, faculty advisor, looks on.

Student Chapter News

Iowa State College

The Iowa State College Student Chapter officially received its AFCA charter on May 22nd to become the fourteenth student chapter of the association. Col. Robert Conrath, president of the Kansas City Chapter, came to Ames to make the presentation to Cadet Capt. James D. Conlan, Signal Corps Senior, first president of the chapter.

After introduction by Major William L. Holcomb, Signal Corps faculty advisor to the chapter, Col. Conrath gave a most interesting discussion of the history of the AFCA and its parent organizations. He reviewed the aims and objectives of the association and proffered the assistance of the Kansas City Chapter in any way possible to further the progress of the new Iowa State College Chapter. The meeting was followed by a smoker-coffee and visitors were told of association benefits by student members.

Guests at the meeting included Col. G. B. McConnell, Artillery, PMS&T, and Capt. Robert J. Yeasley, Signal Corps, Asst. PMS&T.

Founding officers of the chapter are: James D. Conlan, president; Russell B. Lennon, vice-president; Marvin E. Benson, secretary; and John B. Klopstad, treasurer.

University of Virginia

At the Science Open House held at the Engineering School on April 24-25, the University of Virginia Chapter sponsored the Signal Corps exhibit.

Among the equipment displayed and operated by the student chapter members were handi-talkie radios, teletypewriters, telephones and switchboards, and various radio receivers and transmitters. The spetators were given a chance to operate the equipment and thus become acquainted with the type of communications used by the Signal Corps in the field. Of special interest were the handi-talkies which were operated by persons young and old. Two Signal Corps films were also shown to acquaint the visitors with Signal Corps activities.

The entire Open House was attended by several thousand persons from all parts of the state, and the chapter feels they all enjoyed the AFCA exhibit.

At the last regular meeting, the following officers were elected for the fall term: Carl B. Caplinger, re-elected president; Barry D. Barr, re-elected vice-president; L. Myron Diamondstein, secretary; Wheat Wallenborn, re-elected treasurer.

University of Virginia Chapter sponsored the Signal Corps exhibit at he Science Open House held at the University's engineering school. The photos below show some of the equipment being explained and demonstrated by the AFCA student members.

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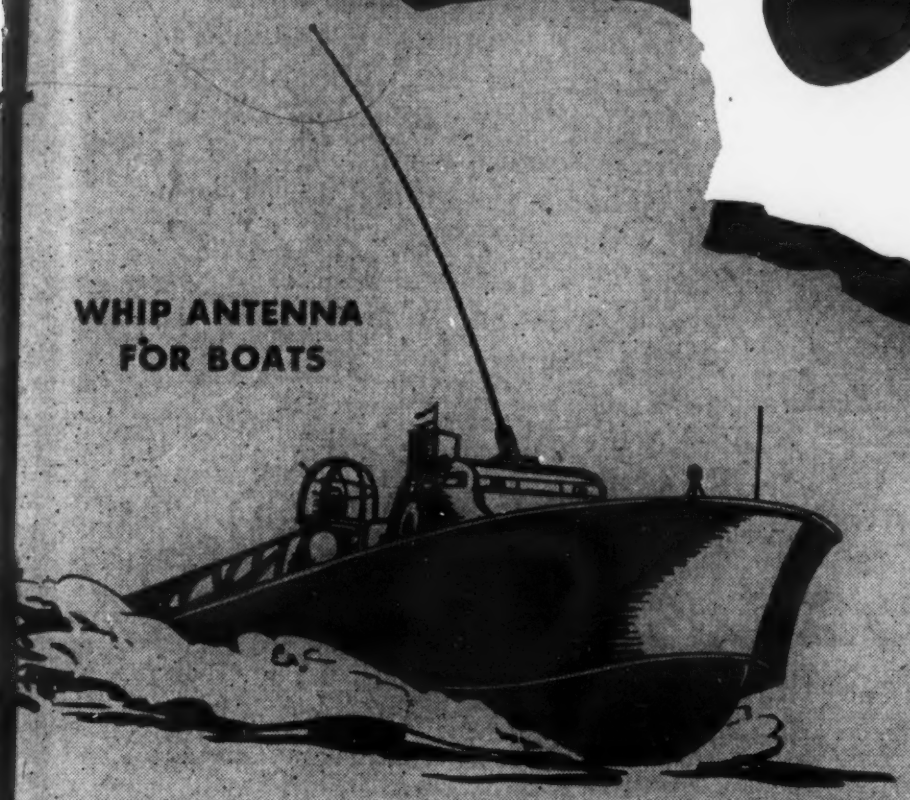

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FOR BOATS

WALKIE TALKIE
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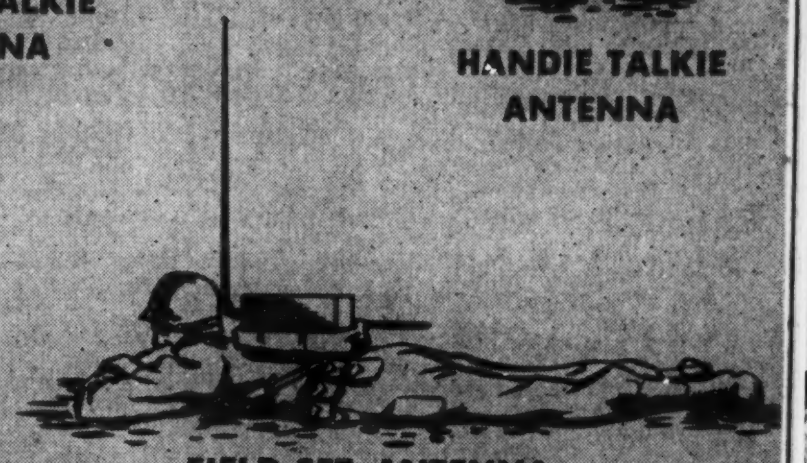

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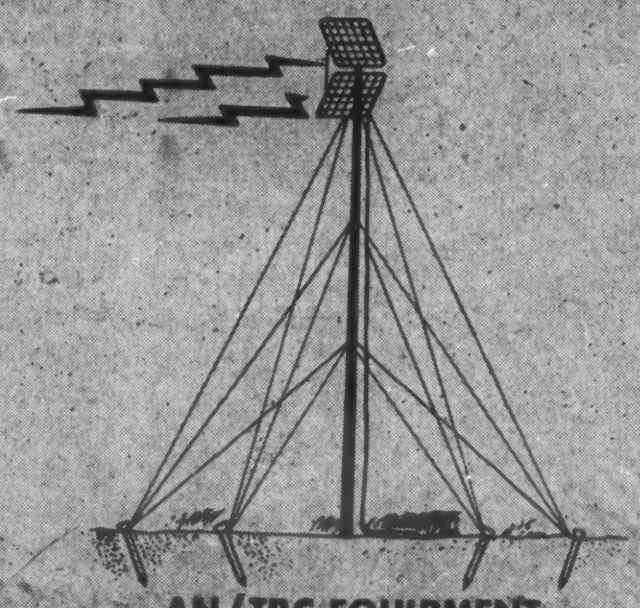
JEEP ANTENNA



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NEWS

Communications-Electronics-Photography

KELLOGG COMMUNICATION TRAINING PROGRAM FOR AIR FORCE REPRESENTATIVES

Two new and completely-equipped modern communication classrooms, replacing outgrown quarters, have been opened at the Chicago factory of the Kellogg Switchboard and Supply Company for airmen and Air Force civilian personnel to study operating phases of CrossBar dial central office equipment. The above picture, in which Arthur T. Sigo, chief dial system development engineer, describes the basic operation of a Kellogg CrossBar switching unit, shows the demonstration classroom which enables the trainees to study equipment first hand.

Modern military teaching techniques, developed and refined during World War II, in conjunction with unusually complete technical educational facilities have made it possible to compress the comprehensive course into eight weeks of study.

The training course covers fundamentals, as well as a practical working knowledge of CrossBar dial central office equipment which is currently being installed at various Air Force bases.

The streamlined teaching techniques and tailor-made training aids combined into a condensed curriculum include the following innovations:

(1) Emphasis placed on "learn-by-doing" activities which are closely supervised by specialists whose total experience in the telephone business exceeds 400 years; and

(2) Generous use of visual training aids coordinated with a wide range of demonstrating equipment.

(3) A roomy shop and demonstration classroom permitting trainees to study at first hand, among other things, a standard operating CrossBar switchboard model identical to those being used by the Air Force; and

(4) A large conference-type lecture classroom furnishing each trainee liberal table space for spreading out large drawings, a comfortable arm chair and good illumination and ventilation in a quiet spot in the factory office building.

The Air Force trainees attending the school return to their bases as CrossBar central office technicians familiar with the latest automatic telephone switching systems utilizing the three basic switchboard components: the 4000-type relay, the unique magnetic impulse counter, and the plug-in, drawer-type CrossBar switch, all developed and manufactured by the Kellogg Switchboard and Supply Company, a division of the International Telephone and Telegraph Corporation.

50th Anniversary of Powered Flight

The first solo 'round-the-world flight, completed 20 years ago by Wiley Post, was commemorated at ceremonies at the Smithsonian Institute in Washington recently when the Sperry automatic pilot which made Post's flight possible was presented to the National Air Museum.

The robot equipment is mounted in a demonstration case with crank controls so it can be operated by visitors.

The presentation was arranged by the National Committee to Observe the 50th Anniversary of Powered Flight as a milestone in half a century of aviation progress since the Wright brothers first flew at Kitty Hawk, N. C., in 1903.

On the solo flight, which lasted 7 days, 18 hours, and 49 minutes and during which time Post covered 15,596 miles, his only companion was a then-new automatic pilot developed by the Sperry Gyroscope Company. Post's solo flight was a great contribution to the advancement of airpower in that it established the reliability of the automatic flying aids.

New Wire Splicer Speeds Signal Corps Wire Work

A revolutionary tool for splicing communication wire has recently been developed under Signal Corps sponsorship by Aircraft-Marine Products, Inc. The splicer, which is semi-automatic and easy to use—even where extreme cold requires the wearing of mittens—will eliminate to a great extent the slow hand-splicing method now used.

The splicer, known as Signal Corps Wire Splicing Tool, TL-582/U, is the result of extensive research and development to find a satisfactory method of splicing telephone and telegraph field wire under all weather conditions.

Essentially, the new system of wire splicing consists of two interrelated elements: the tool itself and the specially designed connector sleeves.

Among the outstanding features of this new splicing system are the following:

1. Makes a complete splice in less than 30 seconds. (Old method,

3 to 4 minutes.)

2. Wireman wearing mittens can easily make perfect splices.
3. Eliminates need for rubber tape and friction tape. One tool replaces knife and pliers required for conventional splice.
4. Because tool cannot be released from wire until splice is fully completed, chances of imperfect splice are nil.

The new tool is figured to save countless minutes on the battlefront and shorten the length of time a repairman is exposed to enemy fire.

New RCA "Premium" Tube Shakes Off "The Shakes"

A new RCA electron tube specially engineered to shake off the "shakes" of airborne and mobile electronic communications equipment has been made available commercially by the Tube Department of the RCA Victor Division.

The new "premium" type tube (RCA-6101) is designed specifically for use as class A amplifier and control tube in applications where dependable equipment performance hinges on the ability of electron tubes to take abnormal shock and vibration.

The new medium-mu twin triode is a top-drawer version of the famous RCA-6j6, a preferred tube type for use in communications equipment and home radio and TV sets. The RCA-6101 was developed by RCA engineers to meet industry needs for a tube which coupled 6j6-type characteristics with the physical ability to withstand the punishing operating conditions of airborne and mobile applications.

Constructed and processed to meet military requirements, the new tube resembles the RCA-6j6 only in electrical characteristics, dimensions, and basing arrangement. Internally, the RCA-6101 has been redesigned from the glass stem up to increase structural strength and improve performance.

The new tube incorporates numerous added structural features: chrome-copper siderods to cool the grids and restrict the development of grid emission; a pure-tungsten heater to provide long life under frequent on-off switching operation; additional top and bottom mica insulators to minimize cathode shift; additional insulating material applied to the heater to give additional protection against short circuits between the heater and the cathode under conditions of extreme vibration.

Man-Made Moon

Two Signal Corps scientists and a noted figure from Franklin Institute look at models of multi-stage rockets which were used in an address proposing orbital establishment of a foil-covered balloon to serve as a new geodetic reference point. In the center is Dr. I. M. Levitt, director of Franklin Institute's Fels Planetarium; on the left is Hugh H. Waesche, deputy chief of the Frequency Control Branch of the SigC Engineering Labs; and W. L. Doxey, acting branch chief, stands on the right.

ULTRASONIC RADAR TRAINER

Development of a revolutionary new device for the bombardment and navigation training without actual flight of aircraft observers of Air Force air crews was announced recently by the U. S. Air Force's Air Research and Development Command at Baltimore, Md.

With this ultrasonic (above the speed of sound) radar trainer, identified as the AN/APQ-T1, future air crews will be able to become familiar with flight problems, including targets, anywhere in the world while still on the ground in this country. It was designed and built for the U.S. Air Force by American Machine and Foundry Company's Electronics Division, Boston, under the supervision of equipment technicians at the Air Research and Development Command's Wright Air Development Center, Dayton, Ohio.

The basic principle that makes possible the operation of the AN/APQ-T1 trainer is the fact that there is a ratio of 200,000 to 1 between the

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speed of electromagnetic waves in air and the speed of ultrasonic waves in water. As a result of this ratio, it is possible to simulate radar flight by moving an ultrasonic transmitting and receiving apparatus over a reduced scale terrain contour map of a portion of the earth's surface.

The map, which is only 1/200,000th the size of the area it represents, is submerged in a tank of purified water held at a constant temperature in order to keep the scale factor constant.

Above the map, but also submerged in the water, is a simulated radar antenna, the position of which can be controlled and maneuvered by the instructor-director, at a control console, acting as the aircraft's pilot.

Motion of the radar antenna directed by the instructor from point to point above the map simulates the flight of a bomber. Instead of sending out radar pulses, however, it transmits pulses at ultrasonic frequencies. These travel at a much slower speed than radar pulses, but in all other respects, the sound pulses behave like radar pulses. They strike the terrain and are reflected back, converted and displayed on the trainee's screen.

NAVY TELEMETERS PHYSICAL CHECK-UP

The time is tomorrow. The Navy's new million-dollar X-10 stratospheric research plane is screaming along at 75,000 feet at Mach 2. Inside, in the purplish darkness of the tiny cockpit, the pilot stares fixedly at his instrument bank.

In his earphones, a voice shouts, "Wake up, Kistner, you are passing out! Your oxygen tank must be empty! Switch to your reserve tanks!"

Roused by the radioed voice from his project engineer on the ground below, the pilot manages to turn on a

A close check is kept upon the telemetered data that records the mental and physical condition of the pilots.

new tank of oxygen. His head clears. He brings the ramjet plane out of the screeching dive headed toward the earth and flattens out at 50,000 feet. The pilot's life had been saved and the expensive plane also, thanks to the ability of ground observers to watch his physical condition while he was watching the flight instruments.

The above case is fictional but the Navy today has developed a telemetering system which will enable it to do just that—keep close tab on the mental and physical condition of its pilots while they are flying.

The system has been two years in the making at the Naval Medical Research Institute at Bethesda under the guidance of Cdr. Norman L. Barr, head of the aviation research branch. It has been proved with pilots flying overhead and revealed to the public at the Aero Medical Association's annual meeting in Los Angeles in May.

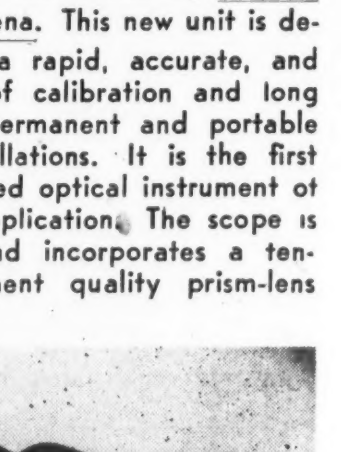
By reading a bank of instruments and inked rolls of paper, Cdr. Barr, sitting in a Los Angeles hotel room, was able to tell how his two "guinea pig" pilots 6,000 feet over the city in an R4D were functioning.

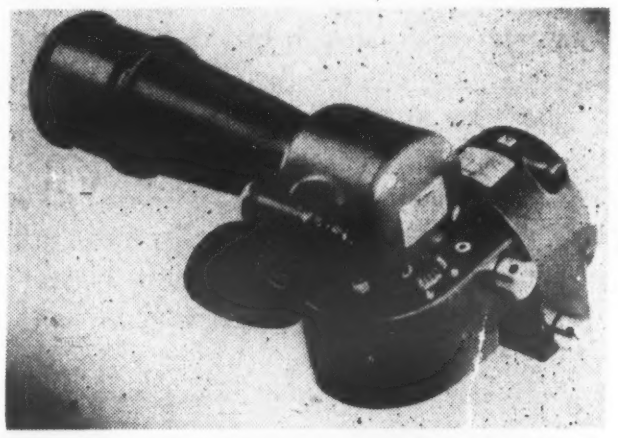
By means of telemetering, doctors down below can watch how the pilots' mental and physical faculties are functioning. Tiny silver electrodes fastened on the pilot's forehead, nape of his neck, shoulders and legs, gather the faint electrical waves from the body. Behind the pilot's back is a small electrical device which multiplies these waves 60,000 times and reports them back to the earth via the telemetering system over UHF.

(Naval Aviation News)

NEW PRODUCTS

Precision Apparatus Co. announces that patent No. 2,641,630 has been issued on the "Precision" Series TV High Voltage Safety Test Probe. These Test Probes were particularly developed to afford convenient and direct measurement facilities up to 60,000 volts D. C., with complete safety to the operator, with utmost simplicity, speed and accuracy. They provide direct kilovoltmeter facilities for most high sensitivity test sets and vacuum tube voltmeters due to the availability of stock value and special value multiplier cartridges. . . Described as being the "world's smallest magnetically shielded, hermetically sealed transformer" is the Triad Transformer Corp. expanded line of miniature audios. Used with transistor or tube amplifying equipment, these transformers cover the audio frequency range. Advanced techniques in the handling of very fine wire permits this extreme miniaturization without compromise on insulation or moisture protection. These transformers are available in standard MIL cases with mounting studs so arranged that transformers may be mounted in closest possible proximity to each other. . . The Electrochemical Laboratories of Tulsa have introduced a new carbon ink of very unusual qualities. The carbon suspension has the covering power of india drawing ink, but is so stable that it can be used in some fountain pens and withstands freezing and thawing without harm. . . A new line of axial lead ceramic resistors, designed specifically for radio and television applications requiring high quality, low cost components is being produced by The Resistor Division, P. R. Mallory & Co. Conservatively rated, these economical resistors are designed to withstand heavy overloads up to 100% of their rated value . . . Development of a new Radar Boresight Telescope has been announced by Aremac Associates of Pasadena. This new unit is designed to provide a rapid, accurate, and convenient means of calibration and long term checking of permanent and portable radar antenna installations. It is the first completely engineered optical instrument of its type for such application. The scope is of elbow design and incorporates a ten-power high instrument quality prism-lens system.





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WHAT every Russian should know about America's defense

It's no secret . . .

America's defense is America's production potential. And America's production potential rests squarely on the shoulders of manufacturers like Lewyt who stretch defense dollars by shrinking production costs.

Take for example the AN/GRC-9 Telephone and Radio Telegraph Field Set. Lewyt has delivered more than $20,000,000 worth of this equipment to the Signal Corps.

Yet in the face of increased labor and material costs, Lewyt's engineering and manufacturing ingenuity *now* produces the AN/GRC-9 equipment at a *cost practically that of 4 years ago!*

Low manufacturing cost is a Lewyt specialty.

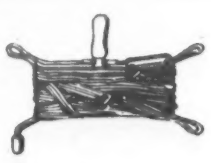
One way Lewyt does it is to manufacture as many as 65% of its own components . . . thus eliminating "double profits." Lewyt not only produces the entire AN/GRC-9, but also manufacturers its transformers . . . chokes . . . chassis . . . housings . . . precision machined parts.

It all adds up to more defense for the dollar.

LEWYT

AN/GRC-9 Telephone and Radio Telegraph Field Set with some of its Lewyt-manufactured components.

Transformers



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Condenser Gear Drive Assembly

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. . . because of all these things, Lewyt could turn its total capacity to defense production tomorrow—and, if necessary, double, triple or quadruple this capacity.

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Radio Military Amateurs

Members of Boy Scout Troop #237, Fort McPherson, Ga., study radio procedure with Sergeant First Class Gordon A. Yarte, MARS operator, at A4USA. From l. to r., around Sergeant Yarte, are First Class Bill Cocke, Eagle Kenny Adamson and Life Walter Warfel.

BOY SCOUTS STUDY RADIO AT 3RD ARMY MARS STATION

A radio club, established at Fort McPherson, Georgia, with assistance of the Third Army Headquarters MARS program, has formed twice-a-week classes in international morse code and fundamentals of radio, including FCC regulations.

When the club was started, several boys, sons of Post personnel, joined in order to obtain help in earning a radio communication merit badge in the Boy Scouts of America program.

Sergeant First Class Gordon A. Yarte, Chief Operator at K4USA, is the instructor. Captain Warren H Robson, Third Army MARS Director, supervises the program.

ARRL Merit Award

Philip S. Rand, a project engineer at the Remington-Rand Laboratory of Advanced Research, was recipient of the American Radio Relay League's Merit Award at its presentation on July 12th at the Seventh ARRL National Convention. Goodwin L. Dosland, President of the ARRL, presented a plaque to Mr. Rand in recognition of his advancement of the welfare of amateur radio through outstanding leadership and technical accomplishment in reduction of television interference.

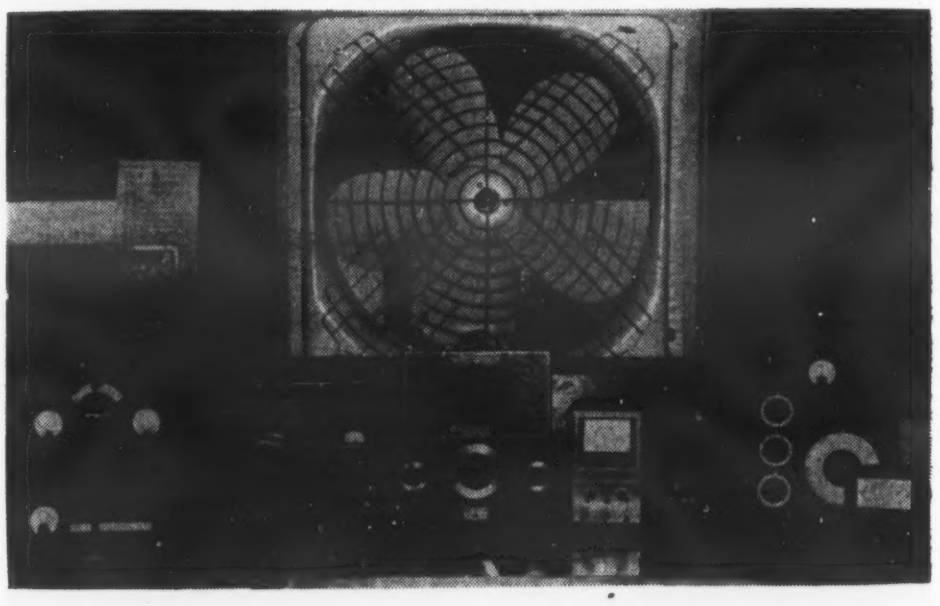
COLONEL CROSHER TO HEAD MARS ADVISORY COMMITTEE

Colonel Kenneth R. Crosher, USAF, Deputy Special Assistant to the Chief of Staff for Reserve Forces, has been elected chairman of the Military Affiliate Radio System (MARS) Advisory Committee for a one year term. Colonel Crosher succeeds Colonel William D. Hamlin, Signal Corps, Chief of the Army Communications, who remains as a member of the committee.

Elected to serve with Colonel Crosher, as vice chairman, was Lieutenant Colonel Frank Chilton, Signal Corps. Colonel Chilton is Chief of the Methods and Procedures Branch, Army Communications Service Division. Both of the newly elected officers hold amateur radio operator licenses and are active in the MARS program.

MOBILE RESERVIST

Cdr. R. J. Woolverton, USNR (W6PQ) has a rather unique amateur radio station installation in his car. All of the equipment is installed in the trunk and is mounted to permit operation from the rear seat. Power supply is conventional and consists of a separate battery and a dynamotor. While the antenna normally used is a whip, a long wire supported by a kite also is available. In addition to his amateur activity W6PQ has been designated an Individual Naval Reserve Radio Station in the Twelfth Naval District Reserve Electronics Program. In this capacity he acts as net control station for approximately twenty other Individual Naval Reserve Radio Stations of the Twelfth Naval District. Although the station is completely mobile, W6PQ has used Treasure Island as a base during the last few months. This station, like many others in the Naval Reserve Electronics Program, is available to provide communications during emergencies.



Electronics test equipment available for use at the Naval and Marine Corps Reserve Training Center, San Antonio, Texas. L. to r.: tube tester, AM-FM signal generator, audio oscillator, capacity and resistance bridge, vacuum tube volt-ohmmeter.

Check the specs...

Check performance...

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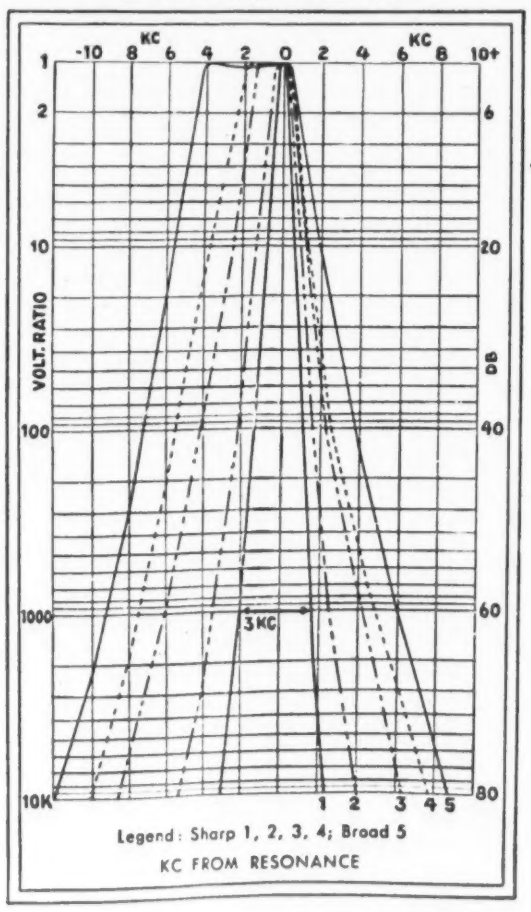
Model S-76

Double conversion receiver. Broadcast Band 538-1580 kc plus three short-wave bands covering 1720 kc-34 Mc.

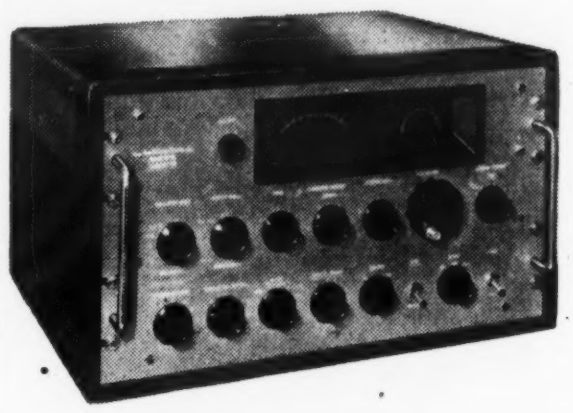
Calibrated electrical bandspread for easy tuning. Double superhet with 50 kc second i-f and giant 4-inch "S" meter. Five position selectivity, one r-f, two conversion, two i-f stages, temperature compensated. 3.2 or 500 ohm outputs.

Satin black steel cabinet. 18½" x 8⅞" x 9½" deep. Nine tubes, voltage regulator, and rectifier. For 105/125 V. 50/60 cycle AC. Use R-46 speaker. . . $199.95

SELECTIVITY CURVES, S-76



Do you know any better way, any other way, to judge SW equipment than to check the specifications and the performance? Frankly that's the only valid way we can think of to make sure you get your money's worth. Check these specs. Take a look at the selectivity curve for the S-76. It is typical of the outstanding value Hallicrafters offers in every price class.



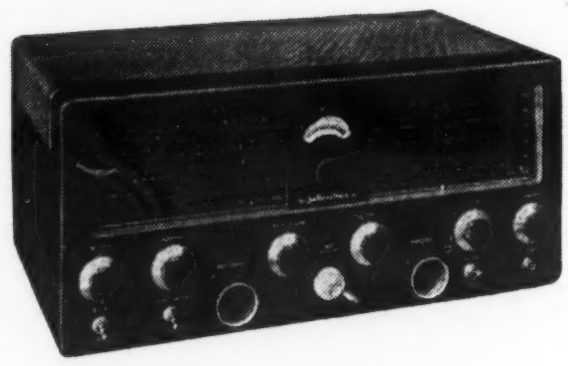
Model HT-20. T.V.I. suppressed 100 watt AM-CW transmitter with all spurious outputs above 40 Mc at least 90 db. below full rated output.

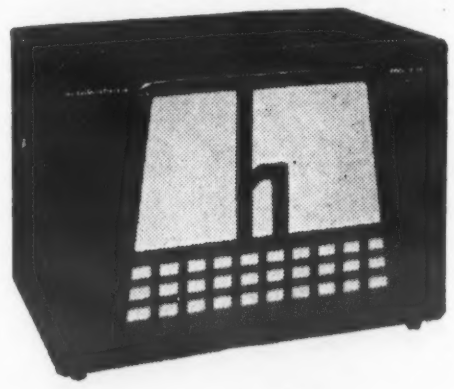
All stages metered; single meter with eight position meter switch; output tuning indication. Frequency range of 1.7 Mc to 31 Mc continuous on front panel control. Seven tubes plus five rectifiers. For 105/125 V. 50/60 cycle $449.50

Model SX-71. Covers Broadcast Band 535-1650 kc plus four short-wave bands covering 1650 kc-34 Mc. and 46-56 Mc.

Narrow Band FM one r-f, two conversion, and three i-f stages. Temperature compensated, voltage regulated. Three watt output (terminals for 500 and 3.2 ohms).

Satin black steel cabinet. 18½" x 8⅞" x 12" deep. 11 tubes plus regulator, rectifier. For 105/125 V. 50/60 cycle AC. Use R-46 speaker. . $249.95





Model R-46. Matching 10" PM speaker for use with Hallicrafters communications receivers SX-71, SX-76, SX-73 or SX-62. 80 to 5000 cycle range. Matching transformer with 500-ohm input. Speaker voice coil impedance, 3.2 ohms.

Satin black steel cabinet matches all Hallicrafters receivers. Cloth covered metal grille. 15" x 10⅞" x 10⅞" deep. Ship. wt. 17 lbs. . $24.95

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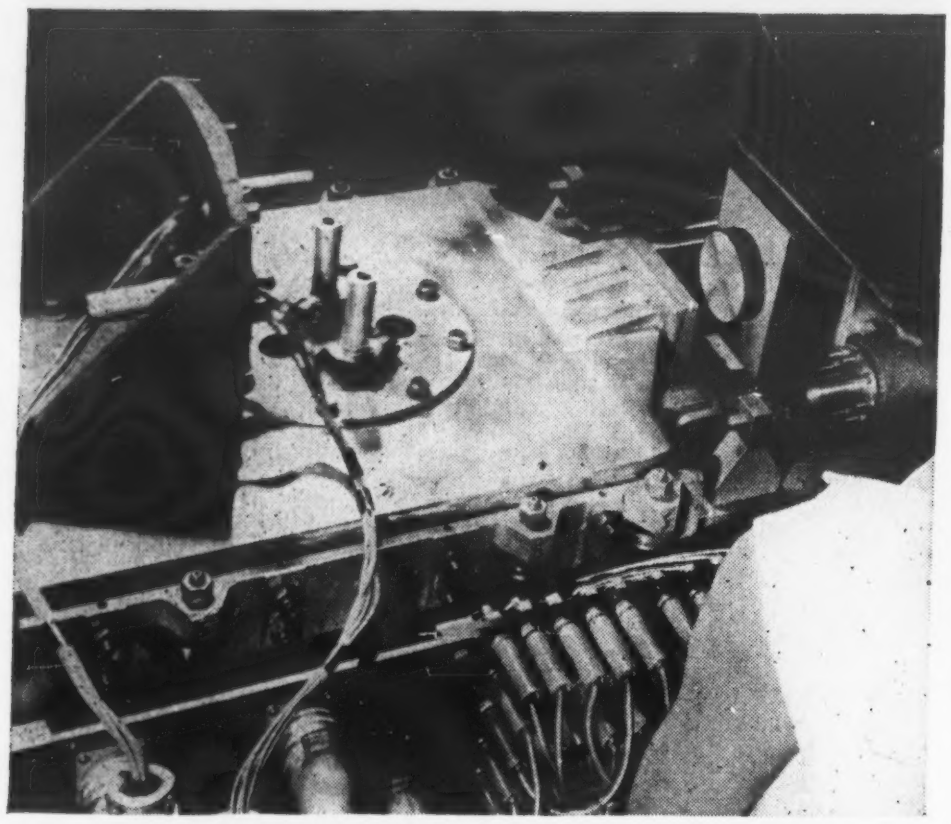
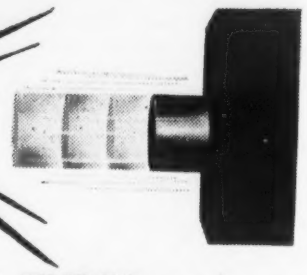


Wham-O



Four TUNG-SOL ELECTRON TUBES receive a terrific jolt as a heavy steel battering ram smashes against the movable table on which they are mounted. Each tube is in a different position to determine stability in all directions. With an acceleration up to one thousand times the pull of gravity, this machine can give tubes a wicked beating.

Vigorous Quality Control procedures such as this give Tung-Sol Tubes the exceptionally high degree of uniformity preferred by the armed services. Quality Control is a whole series of exacting tests and inspections which point the way to better, more dependable tubes—sturdier both mechanically and electrically.

Tung-Sol Tubes for radio, TV and special industrial applications means top performance, longer and more efficient service life, plus lowest maintenance. You'll find complete satisfaction with Tung-Sol Tubes and Tung-Sol Service.

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NRL RADIO STATION "W3WV/3 AT NKF"

Amateur radio operators at the Naval Research Laboratory in Washington operated a "ham" station on July 2, 1953 in connection with the Laboratory's 30th anniversary celebration.

Collaboration with radio amateurs played a prominent part in the history of NRL's introduction and development of high-frequency communications in the military services. This collaboration was commemorated by use of the call "W3WV/3 at NKF" in recognition of Leo C. Young, pioneer radio researcher who worked hundreds of hams from NRL's radio station "NKF" from 1923 to 1943 in exploring the frequency spectrum above 2500 kilocycles following earlier work with hams from NSF and NOF at the Naval Air Station, Anacostia, D. C.

W3WV/3 at NKF was in operation from 11:00 a.m. until 12 midnight. Phone operation was favored from 11:00 to 3:00 p.m. While VFO was used, most operating was done in the lower ends of the phone and c-w bands on 80, 40, and 20 meters. Although atmospheric conditions affected the station's operations, 45 QSO's were made, and 173 amateur messages, which originated by NRL employees and their guests at the anniversary program, were transmitted during this period. Commemorative QSL cards have been mailed to all stations contacted by W3WV/3 at NKF during this one day of operation.

One of the highlights of the day was the visit of Fred Schnell, W9UZ, who flew to Washington for the celebration, visited with Leo Young and other operators of W3WV/3 at NKF, flew back to Chicago and then worked W3WV/3 at NKF on 20 meters. W9UZ was one of the amateurs who collaborated with NKF in the early days of NRL's high-frequency pioneering.

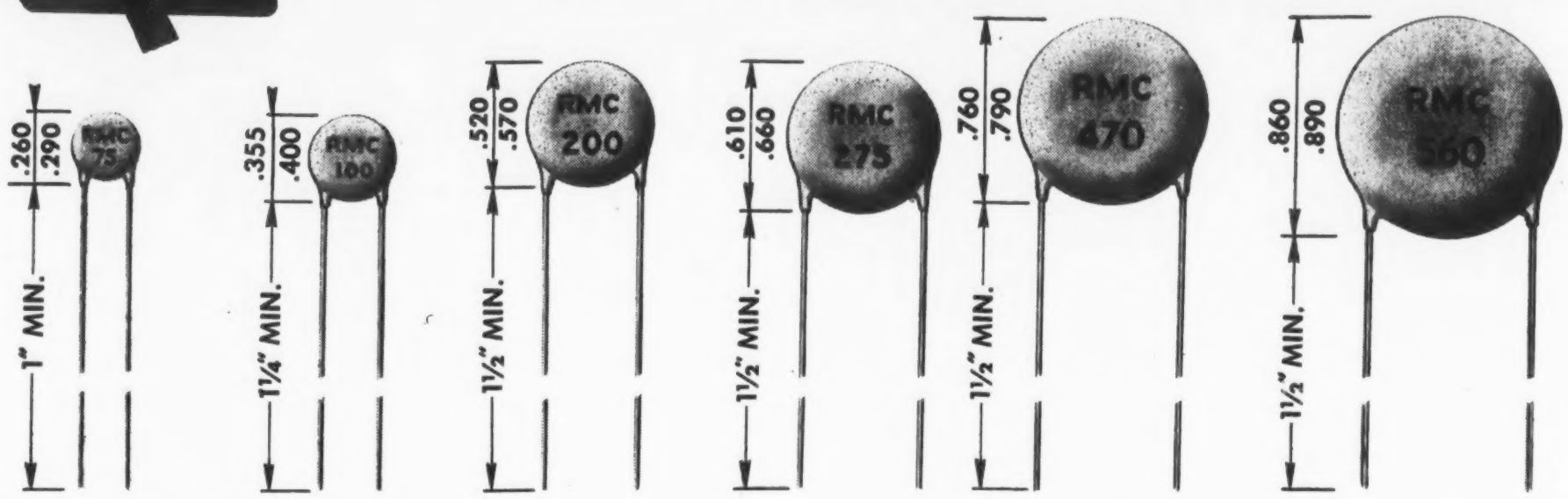
An outstanding event in this collaboration was Schnell's operation of NRRL, the high-frequency experimental station on the flagship USS Seattle that led the Australian cruise.

Leo C. Young, W3WV, chats with visitor Fred Schnell, W9UZ.

DISCAPS

TYPE C

REPLACE TUBULAR CERAMIC and MICA CONDENSERS AT LOWER COST!



TC	1/4 Dia.	5/16 Dia.	1/2 Dia.	5/8 Dia.	3/4 Dia.	7/8 Dia.
P-100	1- 3 MMF	4- 9 MMF	10- 30 MMF	—	—	—
NPO	2- 12	13- 27	28- 60	61- 75 MMF	76-100 MMF	101-150 MMF
N- 33	2- 15	16- 27	28- 60	61- 75	76-100	101-150
N- 80	2- 15	16- 27	28- 60	61- 75	76-120	121-150
N- 150	2- 15	16- 30	31- 60	61- 75	76-140	141-150
N- 220	3- 15	16- 30	31- 75	76-100	101-150	151-190
N- 330	3- 15	16- 30	31- 75	76-100	101-150	151-190
N- 470	3- 20	21- 40	41- 80	80-120	121-200	201-240
N- 750	5- 25	26- 56	57-150	151-200	201-280	281-350
N-1400	15- 50	51-100	101-200	200-250	251-330	331-560
N-2200	47- 75	76-120	121-200	201-275	276-470	471-560

RMC Type C temperature compensating DISCAPS are available in a wide range of capacities in temperature coefficients between P-100 and N-2200. Featuring smaller size, lower self inductance, and greater dielectric strength, Type C DISCAPS assure trouble-free performance on VHF or UHF applications. Rated at 1000 working volts, DISCAPS provide a high safety factor.

Today, practically all major television and electronic manufacturers use DISCAPS. They combine many electrical and mechanical advantages with a lower initial price permitting substantial production cost reductions.

If you have a design problem requiring a standard or special type of ceramic capacitor our engineers are at your service.

SPECIFICATIONS:

POWER FACTOR: Less than .1% at 1 megacycle
WORKING VOLTAGE: 1000 V.D.C.
TEST VOLTAGE (FLASH): 2000 V.D.C.
CODING: Capacity, tolerance and TC stamped on disc
INSULATION: Durez phenolic-vacuum waxed
INITIAL LEAKAGE RESISTANCE: Guaranteed higher than 7500 megohms
AFTER HUMIDITY LEAKAGE RESISTANCE: Guaranteed higher than 1000 megohms
LEADS: No. 22 tinned copper (.026 dia.)
TOLERANCES: ±5% ±10% ±20%
These capacitors conform to the RTMA specification for Class 1 ceramic condensers.
The capacity of these condensers will not change under voltage.

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PHOTOGRAPHY

New Color Temperature Characteristics for Ansco Tungsten Color Films

With the tremendous and continuously growing use of color photography, not only among professional photographers but especially by photographic amateurs, the demand for greater simplification continues in direct proportion.

Since it is quite evident that the average camera fan doesn't wish to spend half his time converting one thing or another to fit the materials at hand, and since standard photoflood illumination for indoor photography seems to be getting more popular each day, Ansco, Binghamton, N. Y., a Division of General Aniline and Film Corporation, announce that they will change the color temperature of Ansco Color Tungsten (indoor) film from 3200°K to 3400°K. The latter will meet the requirements of the photoflood light source.

The new tungsten films will be produced in 35mm and roll film sizes. Ansco Color Tungsten sheet films will not be changed for the time being. The change-over will be a gradual one and it will be some time before the new color film will be generally available.

It might be a good idea for photographers to get into the habit of checking the instruction sheets in their Ansco Color Tungsten Film boxes to be sure they will be using the proper light source.

New USAF Device for Night Aerial Photographs

A new device for providing an intense continuous light source for taking night aerial photographs is being developed for the USAF by a group of scientists and engineers at Wesleyan University, Middletown, Conn., the Air Research and Development Command announced recently.

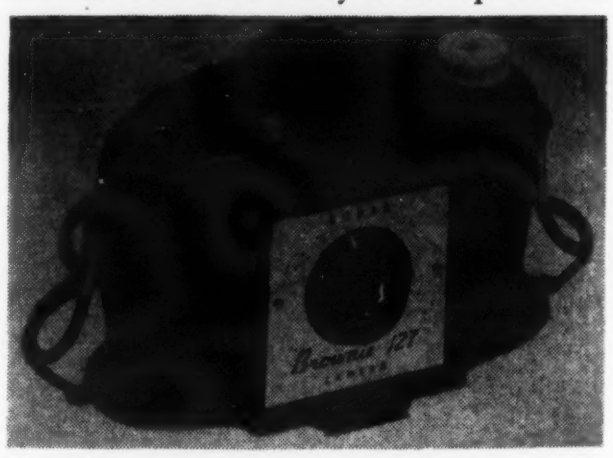
Called the "Hell Roarer," the device enables the taking of night aerial photographs by means of special cameras. The name, given to this mechanism by the Wesleyan group, originated from the roar emitted when in operation.

The mechanism, contained in a torpedo-like 12-foot cylinder, attaches to the wing of a reconnaissance aircraft and is controlled by the pilot. Built-in warning signals indicate if anything is wrong, and the entire mechanism can be jettisoned if the plane is endangered. The fuel for the Hell Roarer is atomized or finely pulverized magnesium powder, which burns at an extremely high temperature and must be handled with extreme care. It puts out an intense light of approximately 10,000,000 candlepower and will burn for more than four minutes. The pilot can turn the Hell Roarer on and off as required.

"BROWNIES" FROM BRITAIN

The Eastman Kodak Company recently announced that it was beginning imports of two inexpensive Brownie Cameras from Kodak's factory in Britain.

The first of the two cameras, the Brownie Six-20 Camera, Model D, features a built-in close-up lens which can be adjusted with a flick of a lever to change the focus from normal picture taking to close-ups down to four feet. It also features built-in flash synchronization which can be used with the Brownie Reflex Flasholder, and an all-metal body which provides



durable construction with a handsome leather-like covering.

The second new import is the Brownie 127 Camera. This camera is a molded eye-level camera with direct view-finder, smooth operating body shutter release, and neck strap.

Negative and Transparency Filing

Professional, commercial, industrial, and technical photographers who must keep their negatives and sheet film transparencies properly filed for ready reference will find a new Kodak booklet titled, "Filing Negatives and Transparencies," of considerable assistance in this respect.

Based on the premise that effective negative filing systems must not only provide for the secure storage of the negatives and transparencies but must also be arranged so that desired films can be readily found, the leaflet outlines tested methods of classifying, identifying, and storing photographic negatives and sheet film transparencies.

A free copy of "Filing Negatives and Transparencies" may be obtained by writing Sales Service Division, Eastman Kodak Company, Rochester 4, New York.

COMBINATION CAMERA AND LIGHTER

A new combination camera and lighter contained in a metal case has been announced by the Westchester Sales, Larchmont, New York. Designated by its distributors as the "Echo 8," the new camera is a fine precision instrument no larger than a standard lighter and is equipped with an f/3.5 lens of 15 mm focal length with the additional apertures of f/5.6 and f/8.

The camera uses cassettes loaded with split 16 mm film and takes 20 pictures which enlarge very nicely to 2" x 2". Both bulb and instantaneous exposures can be made, and the film advance is by means of a milled disk which advances each frame automatically to taking position. Loading is extremely simple. A brilliant finder is provided which functions through an aperture in the cover, exposed by sliding back a metal plate.

Graflex Photo Tips

As a precaution against fogging film in Grafmatic Holders, the slide must be pushed all the way in before making an exposure. This will prevent light leaking through the opening in the end of the septum. It will also cause the septum to hold the film to be exposed in just the proper focal plane.

Special care must be taken to insure proper spacing when using Ansco Color Roll Film dated prior to November, 1953 in a Graflex Roll Film Holder. The spacing mechanism of the holder should be started before the ASA arrow reaches the arrow on the roll holder carriage. The white dot should be used, or in the event of one of the newer carriages without the white dot, the mechanism should be started when the ASA arrow on the film reaches the large arrow to the left of the white arrow on the carriage.

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THESE USAF GLOBAL BOMBERS are maintaining direct radio contact with their base back home—TWO CONTINENTS AWAY!

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Helping to solve radio communications problems is just one of the many ways RCA is assisting our Armed Forces to ensure U. S. supremacy in electronics. Be sure to get acquainted with the RCA engineers and Field Technicians in your branch of service.

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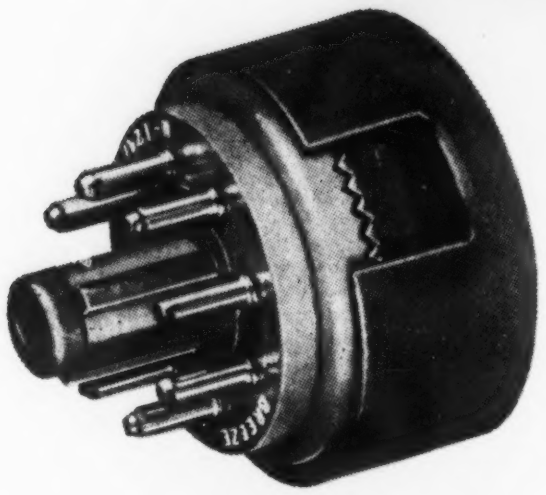
BREEZE MARK

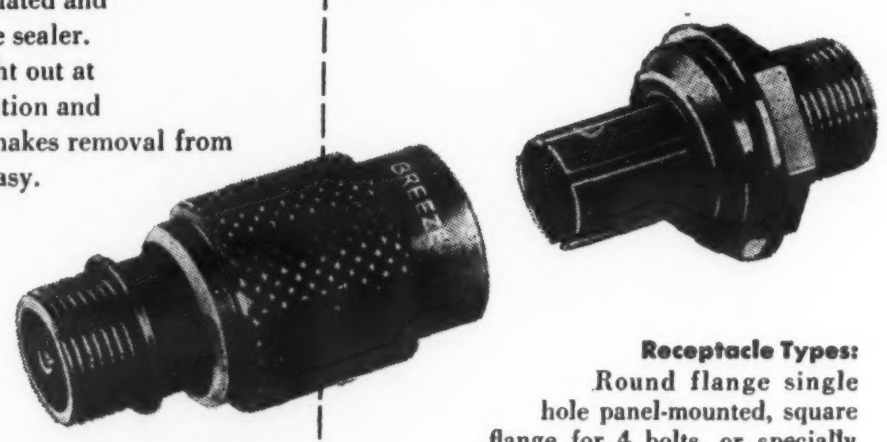


Battery Connectors

8-pin type for both A and B batteries used in all types of field communication equipment. "RUGGEDIZED" for extra security and long service life: polarizing stud is ALL METAL and all metal parts are cadmium plated and sealed with an iridite sealer. Cable may be brought out at any desired side position and locked. Handy bail makes removal from inaccessible places easy.

Quick Disconnect

Simply push male and female members together and lock. To disconnect with minimum resistance, pull back sleeve on plug shell and disconnect. Exceptionally low disengaging force required (less than 6 lbs., excepting pin friction). Vibration proof, moisture-proofed with synthetic rubber insert. Meets AN pin pattern and voltage requirements, in accordance with MIL C-5015. Plug shell and coupling sleeve are aluminum alloy, cadmium plated and iridite-sealed. (Federal Spec. QQP – 416, Type 2.)



Receptacle Types: Round flange single hole panel-mounted, square flange for 4 bolts, or specially flanged to specification. All contacts silver plated.

We invite your inquiries on any problems concerning connectors. Our wealth of engineering experience in this specialty is at your service.

BREEZE CORPORATIONS, INC.
41 South Sixth Street, Newark, N. J.

BOOKS FOR THE PHOTOGRAPHER

PRINCIPLES OF COLOR PHOTOGRAPHY. *By Ralph M. Evans, W. T. Hanson, Jr., and W. Lyle Brewer. John Wiley and Sons, Inc., New York, 1953. 709 pages, $11.00.* . . . Begun in 1938 as a book intended to consider exhaustively the actual basis on which processes of color photography had been and were being worked out, this book provides an unparalleled treatment of the myriad aspects of color photography in an authoritatively technical but understandable way. Provides a valuable basis for understanding the many problems of color photography and is presently the only available textbook on the subject which stresses the development of basic theory.

STEREO PHOTOGRAPHY IN PRACTICE. *By E. F. Linssen. The Fountain Press, London, 1952. 326 pages.* . . . An exhaustive authoritative and well documented treatise on one of the oldest and yet one of the newest of sciences, stereo-photography. It is at once and the same time a practical guide for photographers and microscopists. At this time, when in important directions commercial facilities for practising stereo-photography have made somewhat spectacular advances, no event could be more welcome than the publication of this book, which can justly claim to be a comprehensive and fully up-to-date textbook on the subject.

ARTIFICIAL LIGHT AND PHOTOGRAPHY. *By G. D. Rieck and L. H. Verbeek. Elsevier Press, Inc., New York, 1953. 326 pages. $8.25.* . . . Few can realize how far the progress of artificial lighting is setting the art of photography, both technical and aesthetic, on a new course and opening up to it the most exciting and rewarding possibilities until they have read this book, which is a treatise on artificial light sources and their application in photography. Aimed at and written primarily for the practical photographer, scientific or professional, the scientist and engineer will find much of technical interest in this volume.

SYNCHRO-FLASH PHOTOGRAPHY. *By G. L. Wakefield and N. W. Smith. Fountain Press, London, 3rd Edition, 1952. 179 pages.* . . . A new revised and enlarged 3rd edition of the book which was first published in 1945. A comprehensive and practical handbook and guide to flash photography for both the photoflash and electronic flash types of lamps and includes a full and complete description of the types of apparatus available.

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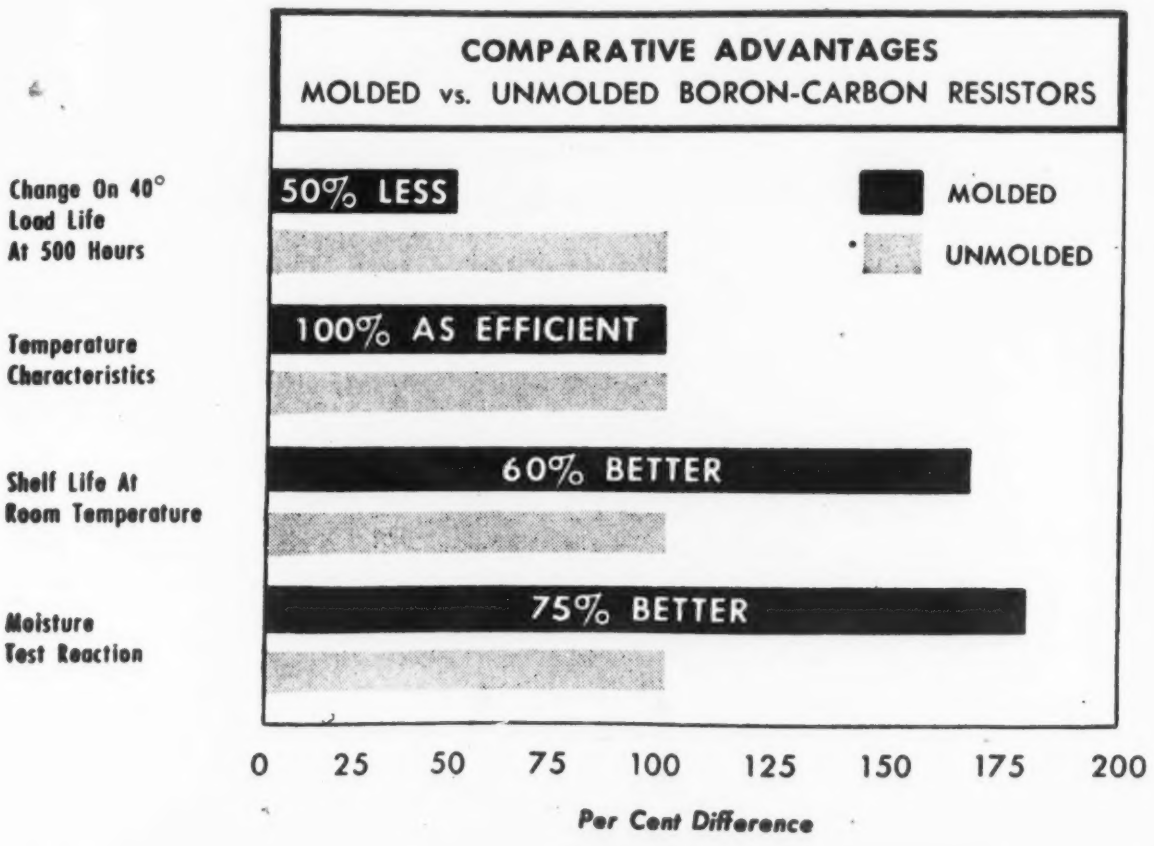

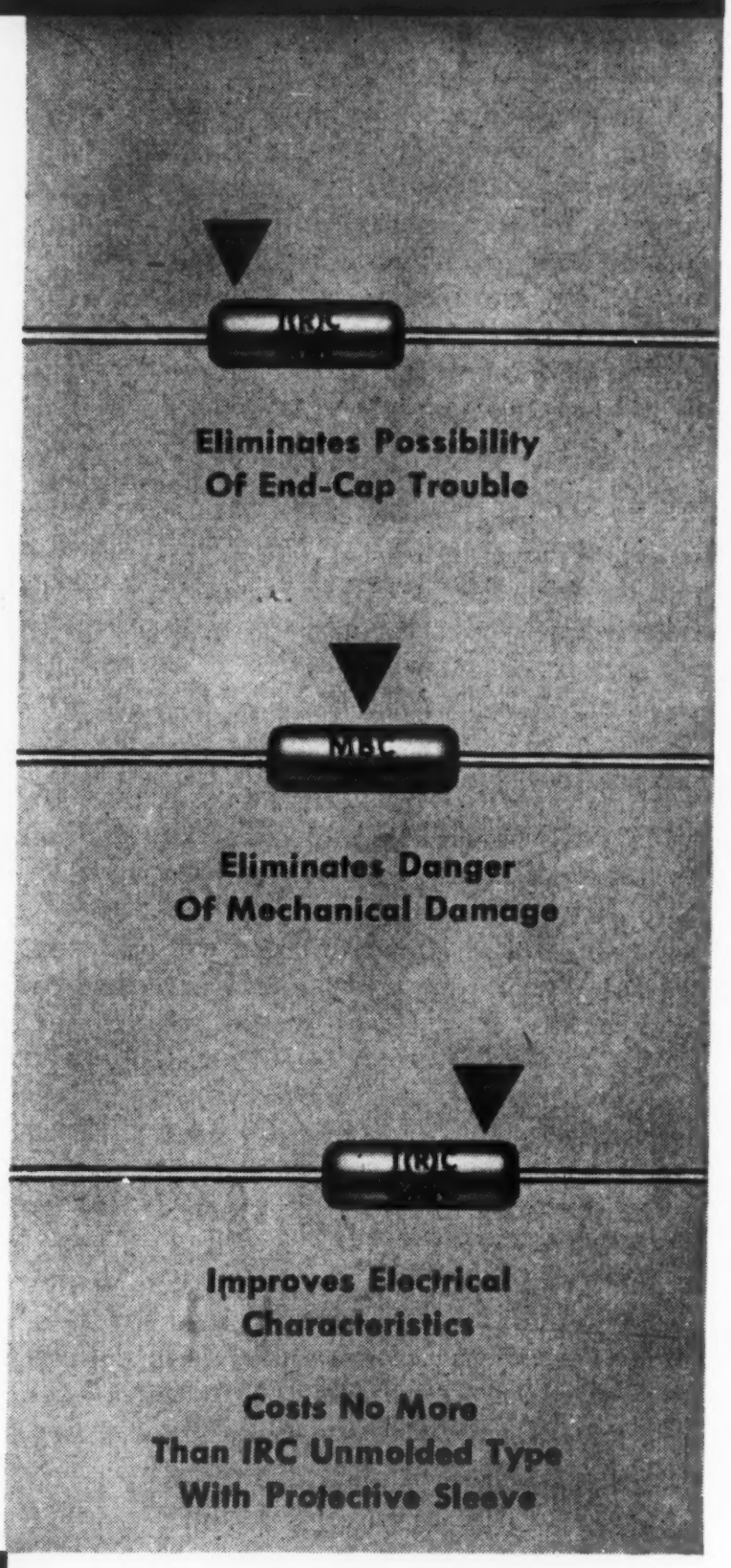

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PRINCIPLES AND PRACTICES OF TELECASTING OPERATIONS. By Harold E. Ennes. Howard W. Sams & Co., Inc. 600 pages.

This book covers all phases of telecasting operations from network and remote links through the monitors, cameras, control rooms, studio transmitters and even production planning. No knowledge of advanced theory or mathematics is required for the understanding of this treatise on the practical aspects of telecasting operations.

This book is written to be of help to all personnel associated with the technical production of video and audio program material from camera, mike or projector, through the transmitter.

STRATEGIC PLANNING FOR COALITION WARFARE, 1941-1942. The U. S. Army in World War II Series. By Maurice Matloff and Edwin M. Snell. Office of the Chief of Military History, Department of the Army. 382 pages, $3.25.

This volume is a study of the evolution of American strategy before and during the first year of American participation in World War II. It is the story of planning by the War Department during that early and significant period in which the foundations of the strategy for the conduct of the war were established.

It tells how General Marshall and his plans and operations officers in Washington influenced the development and execution of strategy for the growing world conflict.

The authors take the reader behind the scenes into the planning councils, the meetings of the American Joint Chiefs with the President, and the high-level international conferences where the fateful decisions were made.

No comparable work on American military strategy has been published. The account is based on thorough, exhaustive research in official and unofficial documents.

A primer for civil and military officials concerned with the nation's security as well as providing a mine of information for diplomatic historians, political scientists, and strategists. *Strategic Planning for Coalition* will also answer the long-puzzling questions of the American troops who were overseas by the end of 1942, and the many others in training camps and supply lines as to why and how the decisions of military and political leaders molded their wartime lives.

RADIO AND TV TEST INSTRUMENTS. Gernsback Publications, Inc. 128 pages, $1.50.

Many service technicians prefer to design and construct their own radio and TV test instruments, and this book is a compilation of test equipment designs which have been built, tested, and used by practicing service technicians.

Originally appearing in *Radio-Electronics* Magazine, they have been combined in one book as a service for the man who builds his own equipment.

The test equipment described in

(*Continued on page* 68)

Communications Systems Philosophy—Continued from page 14

voluntarily to meet an obvious mutual communications requirement, they will be inclined to give enthusiastic support to the system.

As an initial disadvantage, we find that since there are few "teeth" in this control arrangement, the correction of any deficiencies would require more time than would be needed under other forms of control. This follows because of the cumbersome administrative channels which would undoubtedly be used to accomplish the corrective action.

Another and final disadvantage of this form of control is a most serious one. We find that agencies participating in such a system are normally free to withdraw from the system when they feel that the need for their participation no longer exists or that their facilities are needed to a greater degree elsewhere. The withdrawal of one agency under such circumstances may leave serious gaps in the system.

We have discussed but a few of the more obvious advantages of these various forms or types of control. Undoubtedly, you will think of others which might be added to those we have just discussed.

Conclusion

We may conclude that a communications system is a "group of communications facilities so combined by art as to form an integral whole and to operate in unison in obedience to some form of control." From that definition we have gleaned five essentials or features which characterize a communications system, viz., technical compatability, common purpose, common procedure, coordinated action and some form of control.

Before we leave the philosophical aspects of communications systems, several concluding observations should be made.

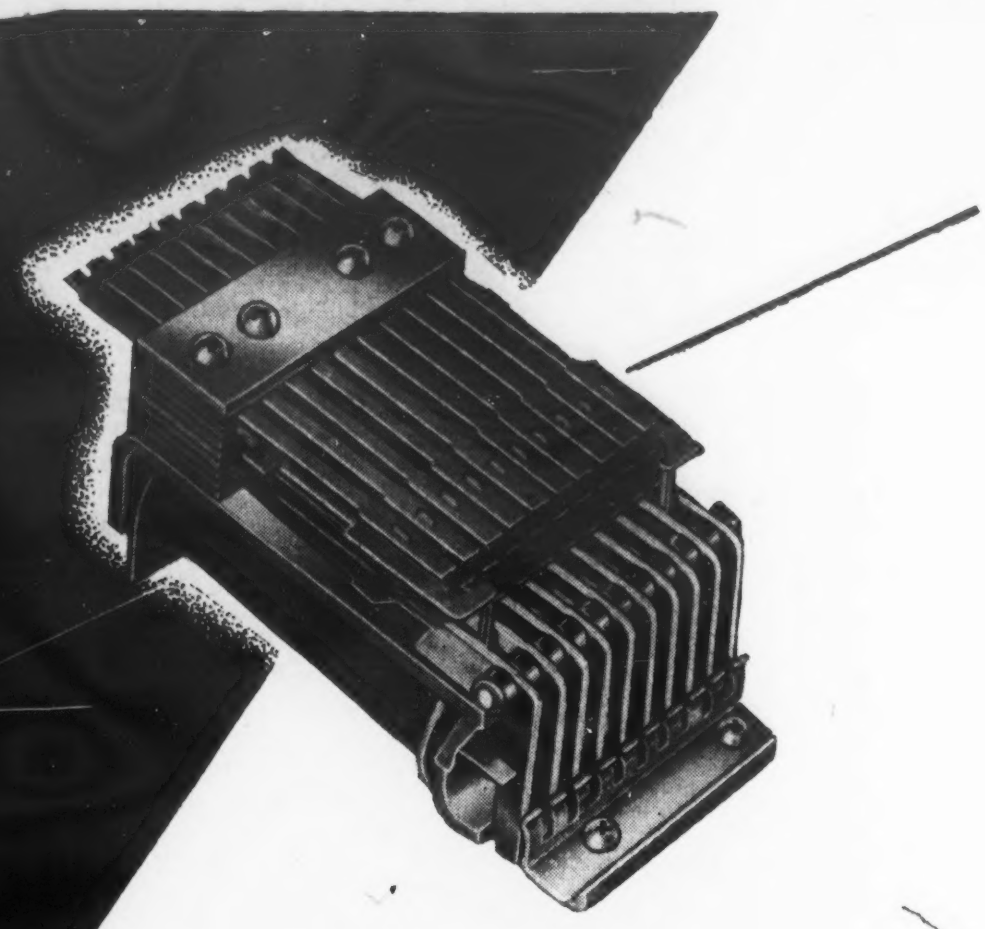
First, that the degree in which it has been possible to develop and refine systems' essentials in the operation of a group of related facilities has a distinct bearing on the effectiveness of the facilities. If all of the features and essentals have been highly developed and faithfully pursued the resultant system should be of the highest calibre. It follows also that less intense pursuit of systems' essentials will result in a less effective association of facilities.

Secondly, we might observe that there appears to be some relationship between the degree or form of control exercised over a system and the degree in which we find the other essentials or features of a system present in a group of related facilities. Certainly it may be said that the machinery of *centralized control* can exert influence on the essential features of a system more readily than can the machinery of *split* or *decentralized control*. However, based on our examination of various systems, we must hasten to point out that the character of the influence exerted under one form of control does not appear to be any better than the character of the influence exerted under the other forms. For example, although common procedures may be enforced more readily under centralized control, it does not follow that those procedures are the best possible type.

In concluding this discussion, I wish to make it clear that what we have stated thus far on communications system philosophy is not offered as the final word on the subject. On the contrary, the ideas we have expressed are preliminary thoughts—thoughts calculated to foster more thinking on the subject. Ultimately we may be able to develop a compendium of thought and opinion which may be used as the basis of all communications systems planning in the Air Force.

KELLOGG

Magnetic Impulse Counter



Check these features

- ☐ The long life and dependability characteristic of relay equipment.
- ☐ Occupies space of only two telephone relays.
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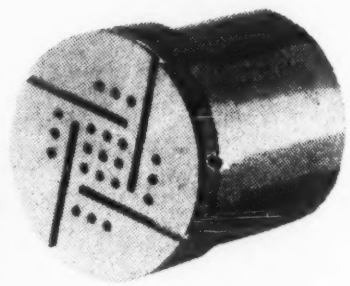
KELLOGG

Midget Condenser Microphone



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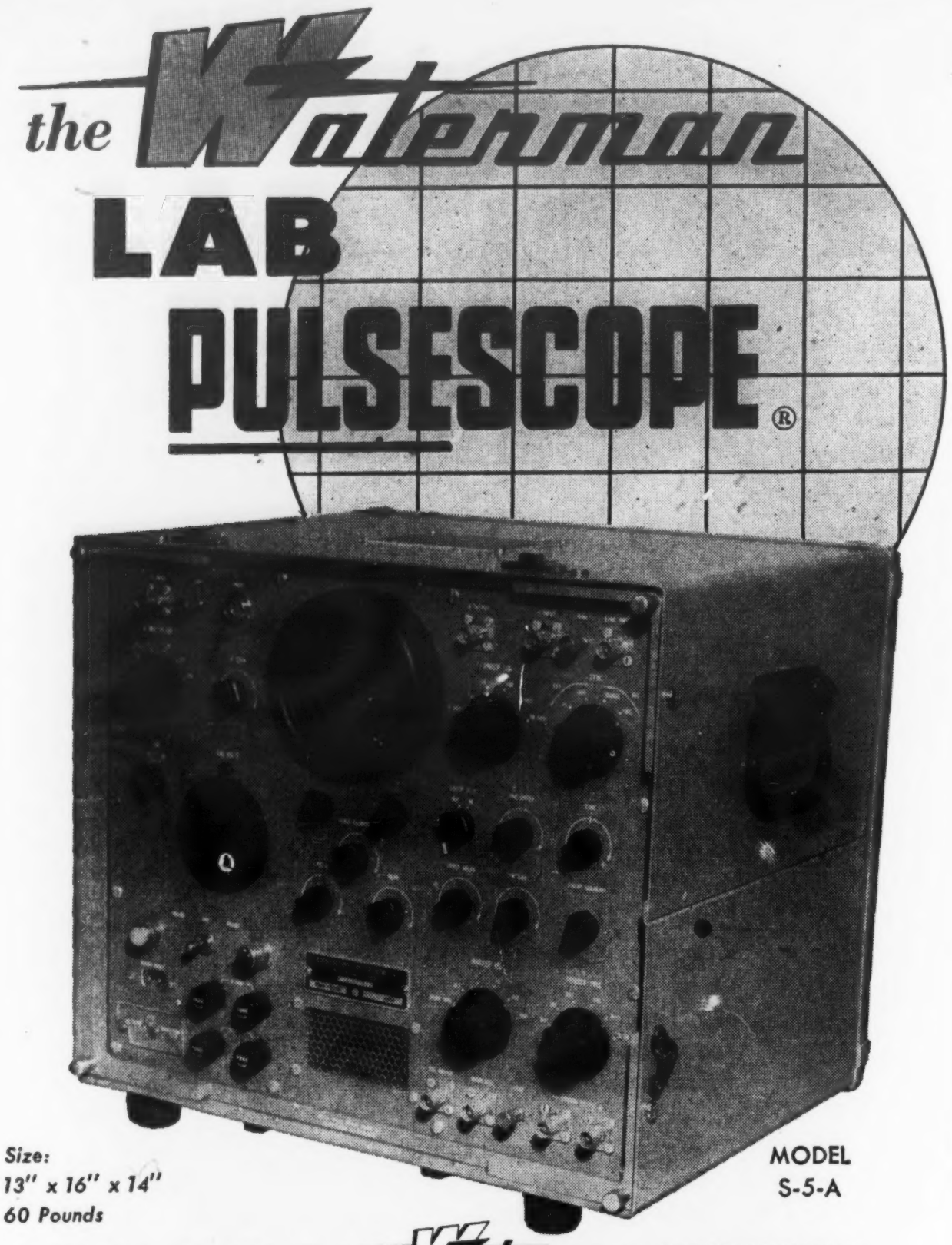

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WATERMAN PRODUCTS

Books

(*Continued from page 66*)

this book covers almost all of the test units used in modern day radio and television servicing. It also contains a chapter on the construction of a carrying case for home service, and one on building a service bench for radio and TV.

A handy guide for those who are interested in constructing their own test equipment and who wish to get the maximum amount of equipment with the least expenditure of time and money.

FIELDS AND WAVES IN MODERN RADIO, 2nd Edition. By Simon Ramo and John R. Whinnery. John Wiley & Sons, Inc. 576 pages, $8.75.

In keeping with the first edition of *Fields and Waves in Modern Radio* this 2nd edition is also a text of the intermediate level. The general plan has changed little except for the added material.

Some of the additions are: new material on horns, slot antennas, parabolids, and receiving antennas in the last chapter on radiation; on slow-wave guiding structures and other miscellaneous guiding systems in Chapter 9; a new chapter on Microwave Networks; new illustrations; MKS units have been introduced in Chapter 2; and graphic aids for transmission line calculations are discussed and charts are included.

This book has been used by General Electric to train their engineers in the field of microwaves and in senior and first year graduate college courses on Electro-magnetic Fields and Waves.

PILOT & AIR-CREW HANDBOOK. Edited by T. J. Bodwell. Pilot's Handbook Co. 72 pages, $2.50.

A 72-page pocket-size handbook that contains a wealth of valuable information for all pilots, air-crew, and ground crew. It is compiled in an easy-to-find form. A few of the sections in this handbook are Air Traffic Rules, Airway Beacons and Airway Flying, Flight Planning, Wind Beaufort Scale, Explanation of Weather Sequences, Maps, GCA Facilities, and Navigation Aids.

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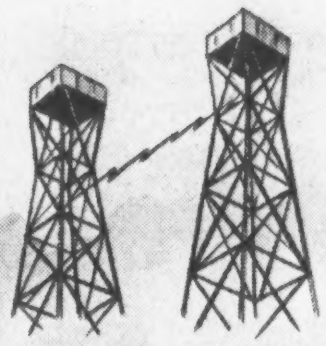
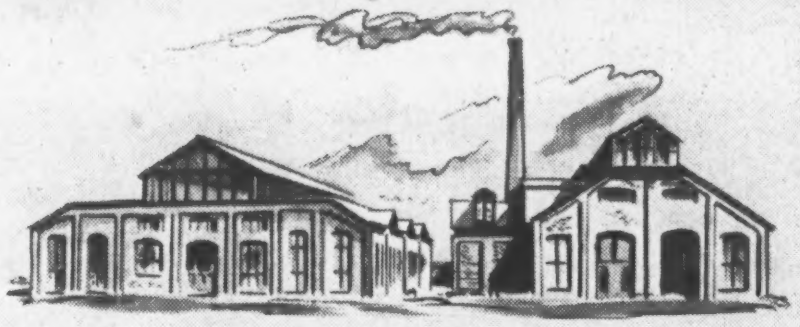


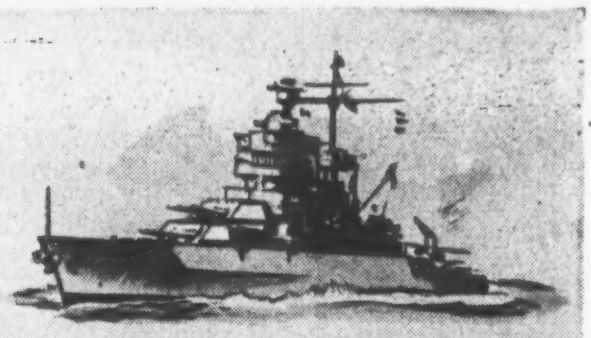
1922—First power line carrier current equipment installed.

1944—First application of frequency modulation to power line carrier current equipment.

1947—First microwave relay system in commercial operation.



1875—Elihu Thomson, one of the founders of General Electric, transmitted and received wireless signals for a distance of about a hundred feet.



1915—Sample radio-telephone transmitter installed on two U. S. battleships and used in 1916 Spring Naval Maneuvers.

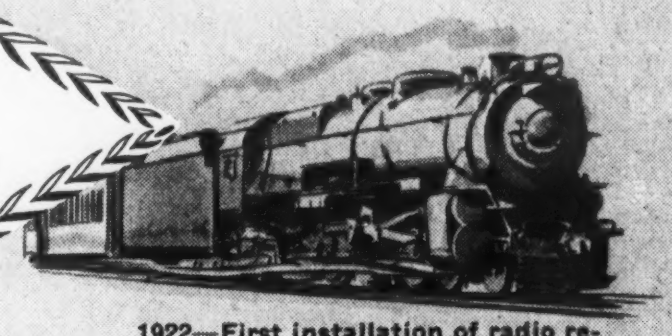
1931—Sonic locator developed for use by ships in fog. It was the first step toward radar.

1937—First application of radio communication aboard fireboats. New York City Fire Dept. installation.

1878 **75** 1953

YEARS OF ELECTRICAL PROGRESS

1923—First airmail plane radio communication equipment installed and tested.

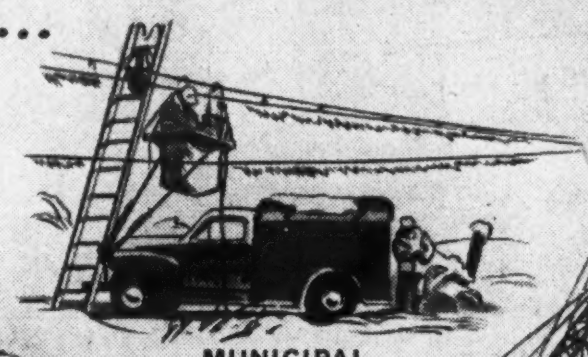


1922—First installation of radio receiver aboard Pullman cars.

1927—First front-to-rear railroad communication equipment installed.

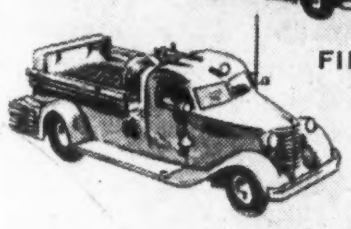
and today...

INDUSTRIAL 2-WAY RADIO

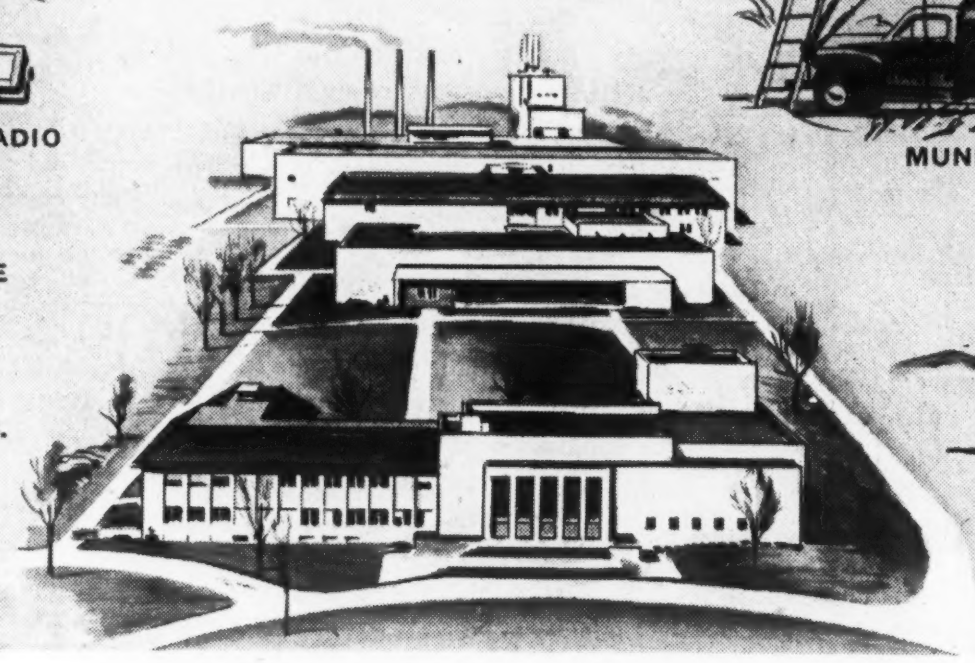


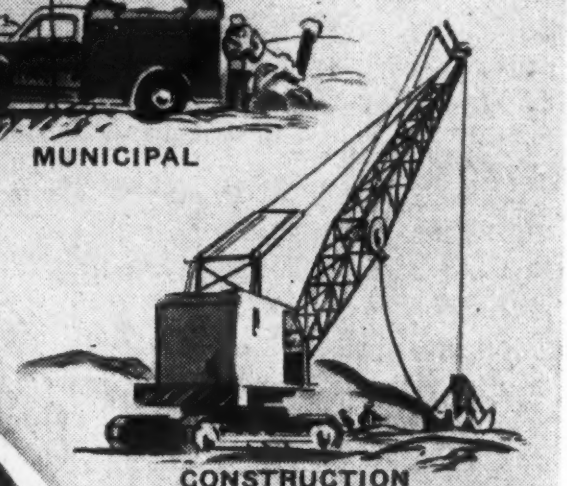
MUNICIPAL

POLICE

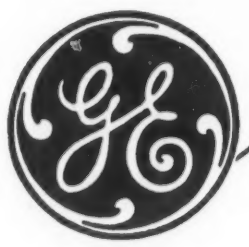


FIRE DEPTS.





CONSTRUCTION



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GENERAL ELECTRIC

Disaster Communications

(*Continued from page* 21)

Handling of welfare messages in Lake Charles was a great relief to the overloaded civilian communications. Chief Blazeth relieved the station-keeper radioman on the Naval Reserve circuit while Chief Hughes manned the amateur frequency of 3550 KCS and established communications with K5NBW (Naval Reserve Training Center, Beaumont, Texas).

After transmitting over 50 messages back to Beaumont for transmission to various locations, it became obvious that other help was needed, and a message sent to W5USN at the Reserve Master Control Station, New Orleans, resulted in assistance from that station.

Another call went out to L. C. BENNETT, ETC (W5NEL), the station-keeper at Shreveport, Louisiana, to come up on the frequency because of heavy traffic to North Louisiana. Chief Bennett came on the air almost immediately and took all traffic for his area.

By midnight, 132 messages had been sent from Lake Charles (K5NBQ) from persons whose homes had been flooded and from persons who wanted their relatives to know they were safe. Places to which messages were sent included Hawaii, Iceland New York, Wisconsin, Washington, etc. . . .

On Sunday morning, the 24th. all messages had been cleared and the flood conditions were easing. The station-keeper radioman had some sleep and after logs and files were squared away, word came about 1100 that circuits could be secured. Hughes and Blazeth returned to Beaumont to find that almost all messages had been cleared with the help of Beaumont amateurs.

Once again the Naval Reserve and its communications demonstrated their willingness and ability to serve.

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3-D and Wide Screen Motion Pictures

(*Continued from page* 25)

right film. The dual projector system suffers from the defect that the system is highly mechanical and costly.

The synchronized shutter wheel system consists of a shutter mounted in a viewing device held by the observer, which alternately covers and uncovers each eye in synchronism with alternating left- and right-eye pictures projected on the screen. It is obvious that such a mechanical system would be cumbersome and unwieldly and, so far as is known at this time, it has not been adopted commercially. It appears unlikely that this system will be adopted at all unless some great technical improvements can be made.

The Polaroid-Vectograph System, which is still in the experimental stage, from advance reports, appears to offer the best and cheapest solution to the problem of true stereo projection. With this system, a whole host of cutting, editing, and other problems are solved in one sweep. Color for this system is promised and, although polarized viewing glasses are required, the system still appears to offer many advantages not offered by the other types.

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VHF Systems in Korea

(*Continued from page* 31)

many valuable lessons. In the best tradition of the Air Force, the "book" has been thrown out to make the equipment work over ranges and signal paths normally considered impossible. The results obtained have proven beyond a doubt that careful receiver tuning and proper transmitter adjustment, together with accurate antenna, are far more important than high power. Extended operation in locations where maximum utilization is made of all possible frequencies has given the operators a new concept of the principles of minimization of interference. Like so much of the World War II equipment in use today it still does the job.

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"I Remember . . ."

(*Continued from page* 33)

continuous attendance, and they can be called any time. All stations doing commercial work use the same "tune." This has one disadvantage, inasmuch as only one pair can work at one time within radius. When, however, more stations desire to work they can do so by changing their wave length. I saw a striking illustration of this recently on board the battleship "Minnesota" in Hampton Roads. She was surrounded by the entire fleet, and most of the ships were hard at work, yet by tuning to Washington the "Minnesota" was receiving hundreds of messages direct from Washington, a distance of a couple of hundred miles, mostly over dry land. Likewise, at Brant Rock, Mass., we were able to get messages through from Scotland, 3000 miles, notwithstanding that 30 wireless outfits, within a radius of thirty miles were doing all they could to interrupt us.

As regards wireless in New Zealand, I should not imagine the Department would experience much difficulty in finding a system to carry out what they want. Any of the various companies would take on the contract, but it would be well in every case to secure a guarantee of effective and reliable working, and to pay no money until such was really established.

Comparing Systems

Speaking generally, the American systems seem to be about the best, and it is in this country that wireless has made the most progress. Among experts the Fessenden system is looked upon as being probably the most efficient on the market, and the high-power plant of that system at Brant Rock, Mass., is considered to be the finest operating outfit in the world. Other systems well-known here are the Stone, Massie, and the Shoemaker. The Stone is rather in favor with the Navy, especially for long-distance work, and the United Fruit Company are using the Shoemaker for a chain of stations to Central America. As for the many alleged exploits of the Marconi system, these are mostly inspired, and are not taken seriously by practical men.

However, an ordinary wireless outfit, capable of working, say, to the Cook Island lighthouses, could easily be made by any skilled eelctrician, of which I understand there are some shining lights in the New Zealand service. There are quite a number of small boys living around New York who amuse themselves by reading ships' messages by means of a home-made receiving outfit and fishing-rod antennae thrown from an upstairs window.

I am always pleased to give any information I am able about wireless, if addressed to me, care of the Agent-General in London. There are several good text-books on the subject, published by John Wiley and Sons, 43, East Nineteenth street, New York City.

America is a great country. Everything seems to go with much more vigor, and the people have more ginger in them than in Europe. There are splendid chances in the U. S. for young fellows. I am very well satisfied myself, as I am making £350 to £400 a year, which is even better than Bloemfontein, O. R. C., where I was fifth assistant in an office of forty-five operators.

With kindest regards to all old colleagues, wishing continued prosperity to your valuable paper.—I am, etc.,

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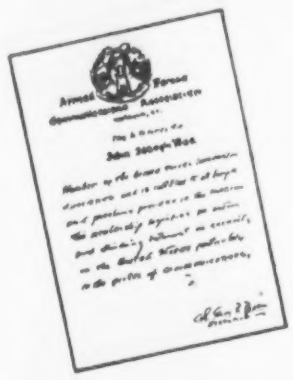

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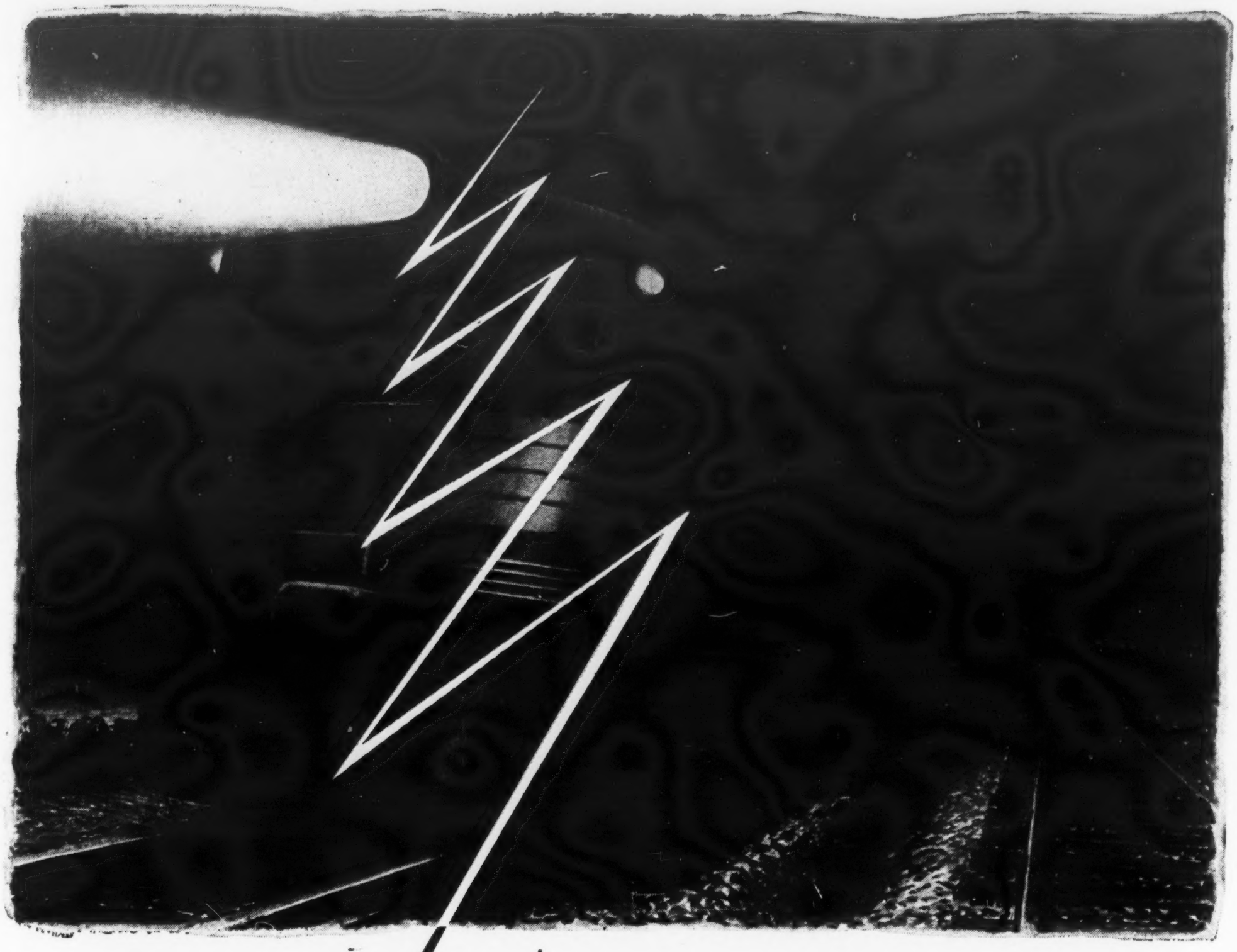

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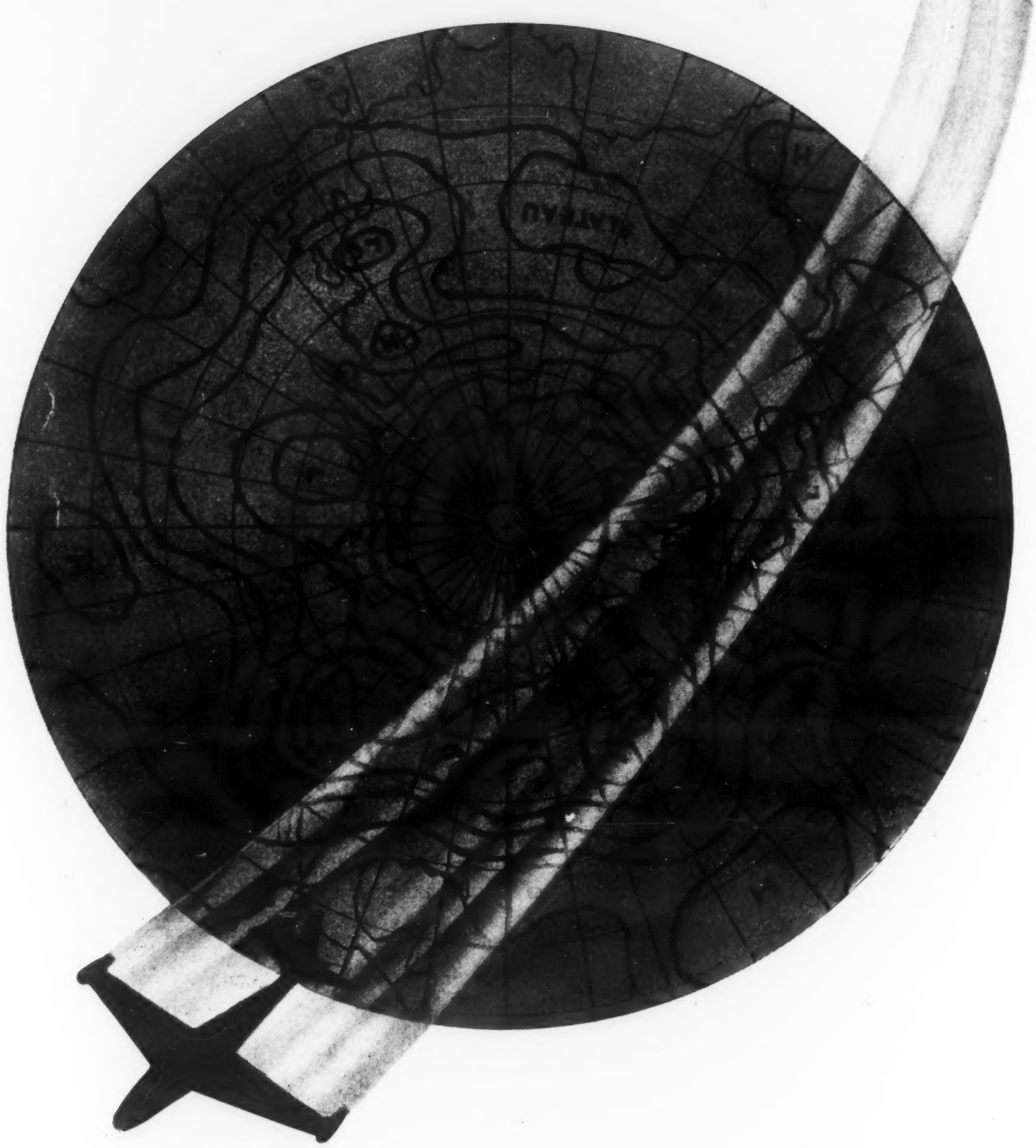

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